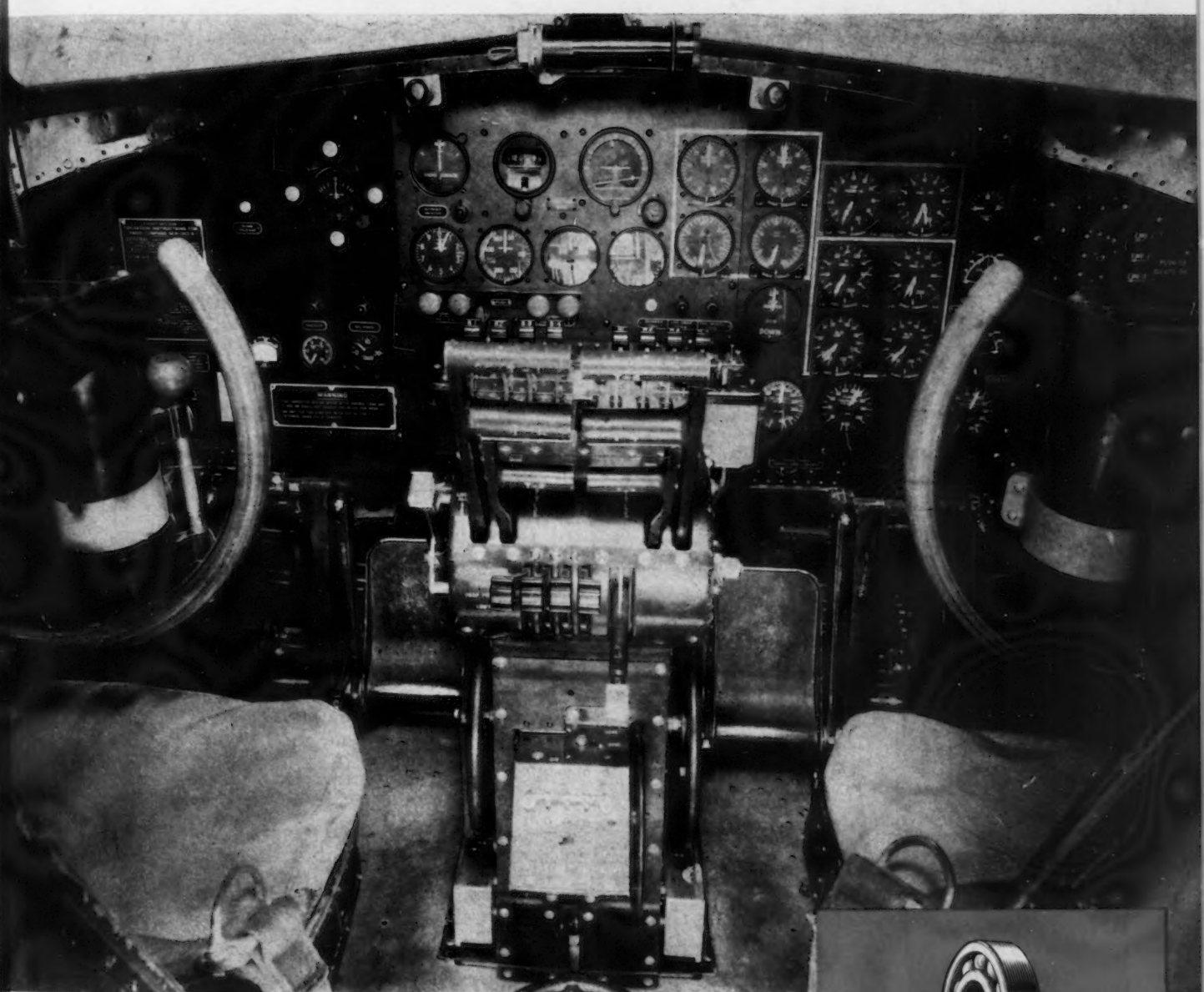
AUGUST 5, 1943

the IRON AGE

AUG 6 1943



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Editorial and Advertising Offices
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HA-HA! HE THOUGHT A SNAKE BIT HIM! I DON'T SEE HOW A GUY COULD BE ABSENT-MINDED ENOUGH TO THINK THAT A SNAKE WOULD BE IN A BIG MODERN PLANT LIKE THIS!
THAT'S JUST TH' REASON! IT'S SO MODERN THAT ONLY A FEW MONTHS AGO WE WAS PICKIN' WILD BERRIES RIGHT ABOUT HERE -- AND THERE WAS SNAKES IN TH' BUSHES!
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Principles for Post War Enterprise

SOME people say that it is too soon to talk about business after the war and that all of our thinking should now be devoted to winning it. And that after it is won will be time enough to plan the shape of things to come.

It seems to me that this attitude overlooks the fact that one cannot shift suddenly from one train of thought and conduct to another with the same facility that one changes cars at a railroad junction.

Our thinking about business after the war and of the relations of Government and the public to it will require just as much careful consideration and preparation and perhaps even more than did the war conduct. Certainly more people will be directly involved.

It required six months of preparation, we are told, to put the North African campaign in motion. It probably required as much time for the planning of the Sicilian campaign. Yet in neither case were there more than a half million of our armed forces involved at the fronts.

Business men, statesmen and thoughtful people in all ranks cannot begin too soon to think about these things. And the thinking should be divorced from politics, class interest and other considerations which prevent the objective approach.

There are four simple principles which, it seems to me, could be used as guides in thinking about business tomorrow and America tomorrow. They are axiomatic and should help one to discriminate between proposals, legislative or otherwise, and policies as to whether they are desirable or undesirable.

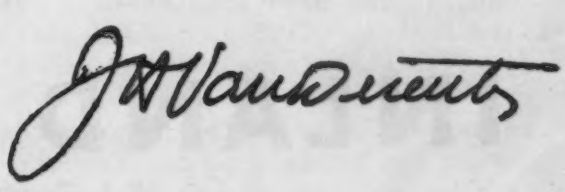
The first principle is this: *The wellbeing of employers, of labor and of consumers is dependent upon the establishment and maintenance of a national environment that will permit the maximum exercise of individualism consistent with the rights of all concerned.*

The second principle flows from the first. It is this: *The maximum exercise of individualism of business, of labor and of the consumer can only be exercised when there is a minimum of government control and of government competition with private enterprise.*

The third principle flows from the first and second. It is: *There can only be a minimum of government control and competition in a self-liquidating national economy in which wages, dividends and taxes result from profits from private enterprise and not from progressive debt financing.*

The fourth and last principle flows from the previous three. It is: *An economy financed by the profits from private enterprise necessitates the greatest amount of broadly distributed purchasing power. This can only be had by securing maximum output of man and machine, maximum employment of our employables and maximum efficiency of management in operation.*

Think over these four principles. They are not as glamorous as the four freedoms nor can they be as attractively illustrated by posters. But if we want to attain the four freedoms as well as several million others, I do not know of a better practical approach to them.



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The IRON AGE
AUG. 5, 1943

NEWS FRONT

• One of the most closely guarded production secrets of the war, here mentioned for the first time, is the making of heavy gun tubes out of seamless tubing, with a breech block upset on one end. Output of one production line alone is over 6000 barrels a month. Timken Roller Bearing Co. developed the technique.

• The entire NE 9600 series of steels, and NE 8020 and NE 8442 all will soon be killed off because of limited usefulness. High silicon of the NE 9400 series likewise has caused difficulties, and a change to 0.20 to 0.30 Si, 0.30 to 0.50 Cr, 0.30 to 0.60 Ni, Mo unchanged, is imminent. NE 9425 and NE 9545 will be added to fill in gaps; analysis of NE 9261 will be changed to 0.10 to 0.25 Cr; analysis of NE 9262 will be changed to 0.25 to 0.40 Cr.

• Coal strikes in July, sporadic and of short duration, none the less accounted for a steel ingot loss of 80,000 to 100,000 tons in that month.

• Steel bullets 6 in. sq. are being heated to forging temperature of 2100 deg. F. in 11½ to 16 min.—in contrast to usual 1 hr. per in.—by high speed gas and air combustion in ceramic enclosures. The new method, now in pilot plant stage in four or five mills, heats 8 in. diameter x 15 in. copper billets to 1500 deg. in 12 min., similar nickel bullets to 1900 deg. in 17 min.

• Successive sinking spells in stock market quotations indicate that for once the Allied war effort must be progressing almost as well as blazoned by the habitually optimistic newspapers.

• Armament schedules, particularly in aircraft, are in a state of turmoil, with many changes underway, inasmuch as Allied military successes have jumped the war timetable ahead 4 to 6 months.

• And: Particularly significant is the imminent severe cutback in the B-29 and B-32 super-heavy bomber program, in favor of light attack bombers and strafing planes for pacing infantry assaults.

• Speaking of heavy bombers, the Germans have not yet used any of their trans-Atlantic types, many of which were seen on test flights almost a year ago. Perhaps a big reserve is being accumulated to Hamburg a couple of American cities.

• The P-51 (Mustang) North American fighter is being equipped with a new Rolls Royce engine and will likely be 1943's best fighter. Bell's Aircobra is also being revamped to take a Rolls Royce engine.

• Very good though the liquid cooled Rolls Royce engine is, the American built type has not kept pace with the numerous improvements made in the British Rolls. The American liquid cooled Allison has never fulfilled expectations. American air cooled engines, however, have no peer.

• Don't expect to see pictures today like those of six months ago showing American Flying Fortresses and Liberators limping home with half their wings shot away. Heavier armor, more guns and ammunition and more bombs have all raised wing loadings so high they won't stand much punishment.

• A new concept of physical chemistry, explaining how micropores separate immiscible phases, has been developed by Selas Co.'s Scientific Equipment division. The principle and its newly worked out techniques promise, for example, automatic removal of condensed water from compressed air lines, without moving parts, and continuous water removal from gasoline.

• Prototype shops for hand finishing aircraft components are sucking in woman power in the snootier London suburbs. The shops, usually in ballrooms, art galleries, squash courts, etc., have unlimited supply of part time workers from the neighborhood.

• Chilean technicians touring American war plants hint that Chile is another Latin American country very much interested in establishing its own steel industry with government backing.

• Swift local annealing machines set up between presses is one possible answer to automotive industry's expected post war demand, intensified by plastic and plywood design influence, for still deeper drawing and forming of sheet steel.

DOLOMITE F

By J. H. CHESTERS
Central Research Department, United Steel Co.'s, Ltd., Stocksbridge, England

TWO serious limitations have hindered, though not prevented, the development of dolomite brick. They are the tendency of calcined dolomite to "perish" on standing, that is, to react with moisture in the air to form hydrate, the reaction proceeding much more slowly than with burned lime, but resulting in a similar expansion and crumbling; and the tendency of β dicalcium silicate formed in brickmaking or in service to invert to γ dicalcium silicate with a 10 per cent increase in volume. This reaction results in the formation of an extremely fine powder and is usually described as "dusting."

Dolomite, both in brick and monolithic form, has played, and is playing, a most important part in the steel plant, but the above limitations require a good deal more imagination and technique to overcome than is required when dealing with dead-burned magnesite.

Since both dusting and perishing (apart from fine grinding) led to the formation of extremely fine dust, the causes of failure of dolomite brick are often confusing. Thus in the early days of dolomite brick manufacture, the presence of free lime in the brick was not uncommon and sometimes led to perishing due to reaction with water in the atmosphere, or from a leaky cooling pipe. On the other hand, a similar phenomenon, actual dusting, might result from the inversion of dicalcium silicate in a brick which had not been completely stabilized. Fortunately X-ray examination provides a ready means of deciding between these types of failure, and it is to the application of this weapon that much of the progress in the manufacture of really stable products can be attributed.

In discussing dolomite products, a further ambiguity usually creeps in: the term "stabilization" is used to cover three quite distinct procedures: (a) The coating of calcined dolomite, for example, with pitch, to *reduce* the rate at which perishing occurs; (b) the conversion of the lime to silicate or ferrite to obviate hydration during storage and use; and (c) the addition of boric acid, phosphates or other stabilizers to prevent the inversion of β to γ dicalcium silicate.

It would be better if the term "stabilization" were applied only to the last two procedures, which are generally carried out simultaneously. Brick made by coating dolomite grains, say with a glassy bond, are usually referred to as "semi-stable" brick since they are far more stable than ordinary calcined dolomite, but do contain considerable amounts of free lime which eventually react with moisture in the atmosphere. Such brick have also been described as "bottled" brick, the lime being uncombined but separated from the atmosphere by an envelope of glass.

X-ray examination shows beyond a doubt that much of the raw dolomite used is a true compound having the formula $MgCa(CO_3)_2$, dolomites richer in lime being simply mixtures of this compound with calcite. When, however, this material is calcined, the carbon dioxide is lost and the product is simply a *mixture* of lime and magnesia. This is proved by the Debye Scherrer X-ray photograph which consists of a super-position of the lines of the two oxides together with a few lines due to traces of impurity.

As might be expected, the lime in this mixture is much more reactive than the magnesia, the perishing of basic being due initially to the hydration of the lime, not the magnesia. The properties of magnesium oxide have been given in the previous section. Those of lime are similar but more "possessive." Thus where basic is heated in contact with silica or ferric oxide it is the lime which reacts first. Like magnesia, lime is a cubic mineral having a specific gravity of 3.08 to 3.30. Pure lime is said to have a specific gravity of 3.32 and a refractive index of 1.83. Its unit cell has an edge length of 4.799 A°.

Previous articles by J. H. Chesters on steel plant refractories, that have appeared in THE IRON AGE are:

"All-Basic Open Hearth Furnaces," Aug. 15 and 22, 1940.
"Steel Plant Refractories," Feb. 6 and 13, 1941.
"Basic Open Hearth Above Sill Plate Level," May 22 and 29, 1941.
"Basic Open Hearth," Aug. 7, 14 and 21, 1941.
"Casting Pit Refractories," Nov. 20 and 27, 1941.
"Electric Steel Plant Refractories," March 5 and 12, 1942.
"Acid Open Hearth Refractories," May 28 and June 4, 1942.
"Soaking Pit and Reheating Furnace Refractories," July 16 and 23, 1942.
"Acid and Basic Bessemer Refractories," Nov. 5 and 12, 1942.
"Silica and Semi-Silica Refractories," Jan. 21 and 28, 1943.
"Magnesite Refractories," June 3 and 10, 1943.

Binary Systems

Fig. 1 shows the outlines of the MgO-CaO system, which were worked out as far back as 1916 by Rankin and Merwin. The phase diagram is very simple. The most important observation for the steel plant is that no mixture of these two oxides has a melting point lower than about 4172 deg. F. Unslagged shrunk dolomite or basic is therefore very refractory.

The $GaO-SiO_2$ system has already been discussed in the section dealing with silica (THE IRON AGE, Jan. 21 and 28, 1943). From the standpoint of dolomite brick, it is simply a binary section of the all important ternary system $MgO-CaO-SiO_2$.

The $CaO-Fe_2O_3$ system is particularly important since dolomite, when used in a steel furnace, is always confronted with iron oxide, either as a slag constituent or as vapor in the furnace atmosphere. It will be seen from Fig. 2 that dicalcium ferrite and mono-dicalcium ferrite have melting points of about 2190 deg. F. and 2550 deg. F. respectively, and hence it is not surprising that iron oxide has a considerable corrosive action even on straight basic. There are two compounds normally formed, namely

REFRACTORIES . . .

. . . Continuing his series on steel plant refractories, the author, in the first of two articles, describes the various dolomite systems, raw materials, and production of stabilized clinker.

$2CaO.Fe_2O_3$ and $CaO.Fe_2O_3$. The dicalcium ferrite is often found in solid solution with Brownmillerite ($4CaO.Fe_2O_3.Al_2O_3$). The 1:1 compound has a very characteristic red color similar to that of Grecian chromite, which shows up even brighter under crossed nicols than in ordinary light. The 2:1 compound is brown.

Ternary Systems

The particular part of the CaO-MgO-SiO_2 system (Fig. 3) which is of major interest to the manufacturer and user of dolomite brick, is the field immediately on either side of the line joining MgO to $3CaO.SiO_2$. Compositions having a higher lime content than those represented by this line may be expected to contain free lime (assuming no impurities to be present) while more siliceous mixtures will contain at least small amounts of dicalcium silicate. It is this fact which makes the manufacture of dolomite brick such a precarious business. The clinker producer is continually balancing his process on a knife edge and whether he falls to the left or to the right he is likely to be in trouble. It will be seen from the diagram that such mixtures are very refractory, but that absorption of silica, such as may occur for example with drip from a silica roof, soon brings the melting point down to open hearth furnace temperatures. It is also of interest to note that in such stabilized dolomite clinkers the magnesia is present in the free state.

The CaO-Al_2O_3-SiO_2 system is of interest because it shows that absorption of alumina by tricalcium silicate results in a rapid drop in melting point. For this reason it is dangerous to allow dolomite brick and fireclay brick to remain in contact for long periods if the temperature is at all high, say over 2370 deg. F. It also shows that the content of alumina in dolomite brick batches should be kept as low as possible.

In the CaO-MgO-Al_2O_3 system it will again be seen that, even with straight 'basic', alumina has a marked fluidifying action. The effect of magnesia in stiffening up melts containing approximately equal amounts of lime and alumina has already been referred to in the section dealing with magnesia.

The CaO-Pe_2O_3-SiO_2 system is of interest as it shows that no ternary compound of lime, silica and ferric oxide is likely to be formed in dolomite mixtures.

The CaO-Al_2O_3-Fe_2O_3 system has not yet been worked out at all fully. It contains the compound Brownmillerite, $4CaO.Al_2O_3.Fe_2O_3$, which appears in solid solution with dicalcium ferrite as one of the usual phases in slagged dolomite brick and basic open hearth bottoms. It is reddish brown in color and often looks like glass.

The portion of the CaO-Al_2O_3-

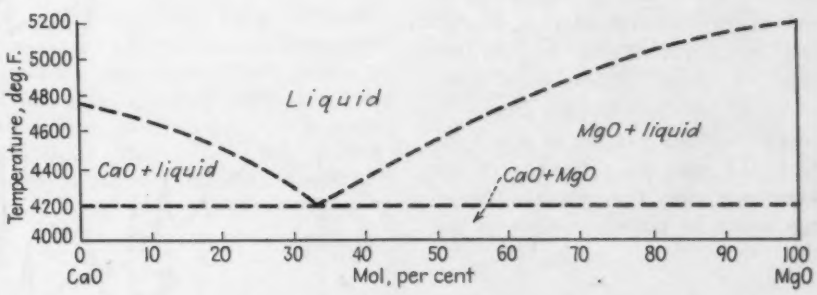

Fig. 1—The CaO-Mgo system (G.A. Rankin and H. E. Merwin).

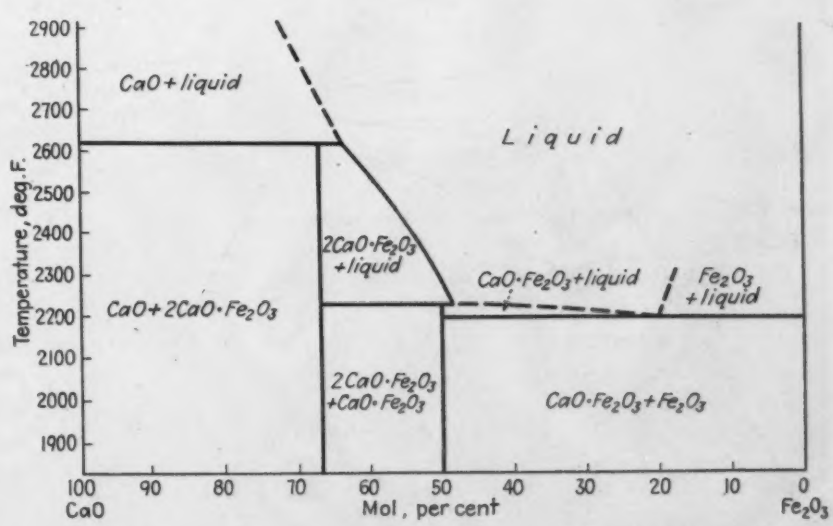

FIG. 2—The CaO-Fe_2O_3 system (R.B. Sosman and H. E. Merwin). Note the low melting points of $CaO.Fe_2O_3$.

Fe_2O_3-SiO_2 system which deals with cement has been worked out in considerable detail by Lea and Parker. The field of interest to the dolomite brick manufacturer and user is however still incomplete. What is really needed is the quinternary system containing the above oxides together with magnesia. It will probably be a long while before this information is available and in the meantime research workers are forced to limit such complex studies to a small part of this system.

Raw Materials

Dolomite, unlike magnesite, is widely distributed throughout the earth's crust and has recently become important because it can be used in most positions in furnaces as a substitute for magnesite. In America the transport distances are great, and unstable dolomite is not as attractive a proposition as it is in Great Britain where the raw material can be mined and calcined within relatively short distance of the steel plant.

The British deposits occur both in the carboniferous and Permian systems and are found in the North of England, in Nottinghamshire, Derbyshire, in South Wales and in the Forest of Dean. These pure rocks consist of an interlocking mass of dolomite crystals varying in size from 0.02 to 0.5 mm. dia. In some of the coarser varieties the crystals are so large as to be plainly visible to the naked eye. Table I gives typical analyses of the British deposits used for the production of basic. Of these, the Derbyshire material forms the basis for the production of both stable and semi-stable dolomite brick. It will be seen that the content of impurities is quite low and that in the main it is the Al_2O_3+Fe_2O_3 content that varies. These pure stones do, of course, occur even in the same quarries, but where the content of fluxes is at all high the stone is not employed as a refractory.

In addition to variations in chemical analysis there are also considerable variations in the texture. Just as silica may occur in a compact form like Welsh quartzite or in a porous form like sandstone, so dolomites of similar analysis may vary immensely in porosity. Whether this has any serious effect on the structure of the fired product has yet to be shown.

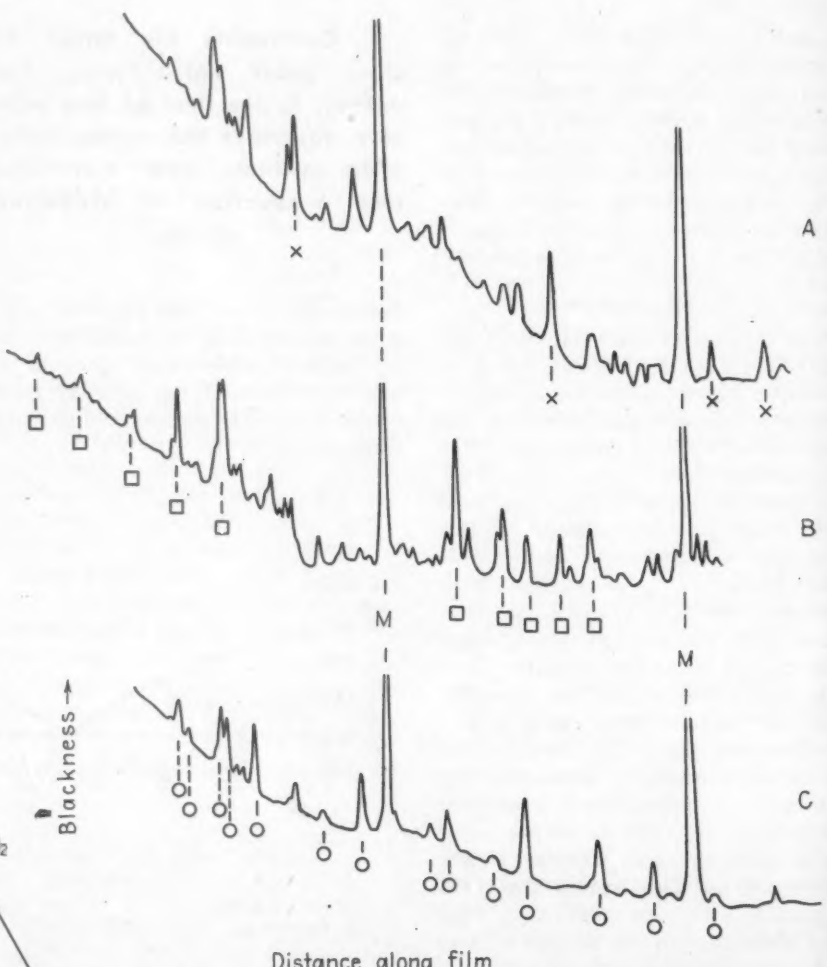

FIG. 4—Photometer curves of Debye-Scherrer X-ray photographs. At top (A) is shown unstable dolomite brick containing CaO. (B) shows dusted dolomite brick containing $2CaO.SiO_2$. Stable dolomite brick consisting of $3CaO.SiO_2$ is shown at bottom (C).

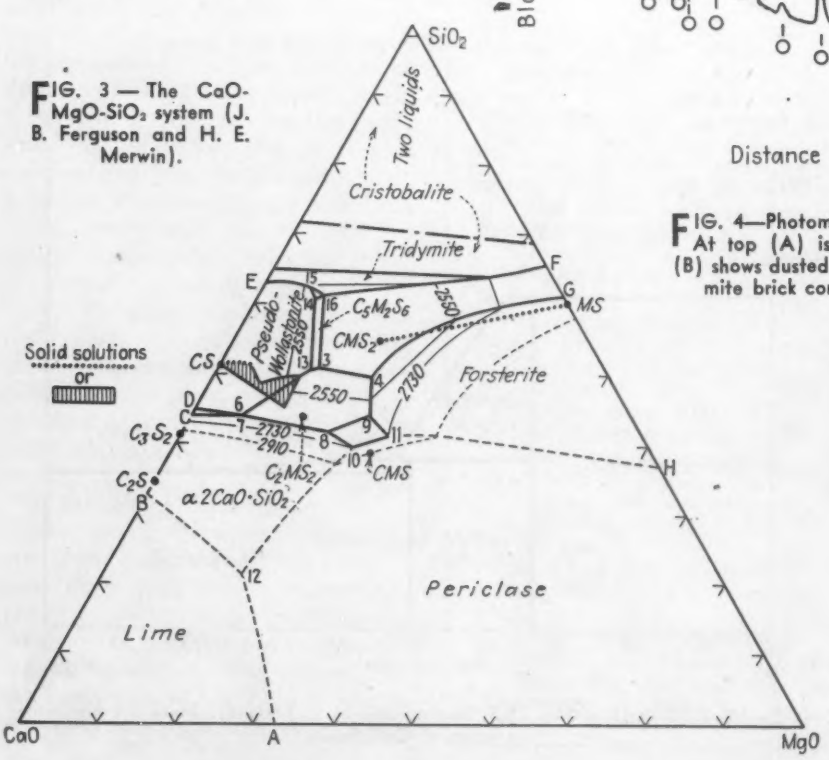

FIG. 3 — The CaO-MgO-SiO_2 system (J. B. Ferguson and H. E. Merwin).

The production of basic consists essentially in carrying out the reaction $MgCa(CO_3)_2 \rightarrow CaO+MgO+2CO_2$. If this reaction is stopped immediately the CO_2 has been driven off, the product is far too reactive and porous for use in the steel plant. The calcination must be carried on to a much higher temperature, about 3092 deg. F., when the porosity drops to a much lower figure (about 15 per cent instead of 50 per cent), and a material capable of being stored for

several weeks without special precautions is obtained. In Great Britain all the dolomite is calcined either in cupolas or kilns. The cupola is fundamentally similar to the kiln, but is narrower in relation to its height and is pressure blown. It is lined with tarred basic and is charged at intervals with alternate layers of stone and coke of about 5-in. size. The coke not only provides the heat to calcine the stone, but also supplies fluxes which aid in the sintering process. Great skill is required in operation of kilns and cupolas if the product is to be uniform. Any tendency of the cupola to slip or channel at one point and thus to yield soft fired material can best be overcome by skillful withdrawal of material at the bottom.

In the United States dolomite is often calcined in rotary kilns and an addition, usually iron oxide, is made to increase the stability of the product, and to speed up the sintering process. Thus one proprietary brand of dolomitic clinker is stated to contain 5.4 per cent of iron oxide, most of which has been added, while others contain considerably more. This means that a proportion of the lime in the product is already combined as calcium ferrites or Brownmillerite before the material enters the steel furnace. The processes which occur during the calcination have been summarized by Thomas, Hallimond and Radley in their Geological Survey report. They point out that the first

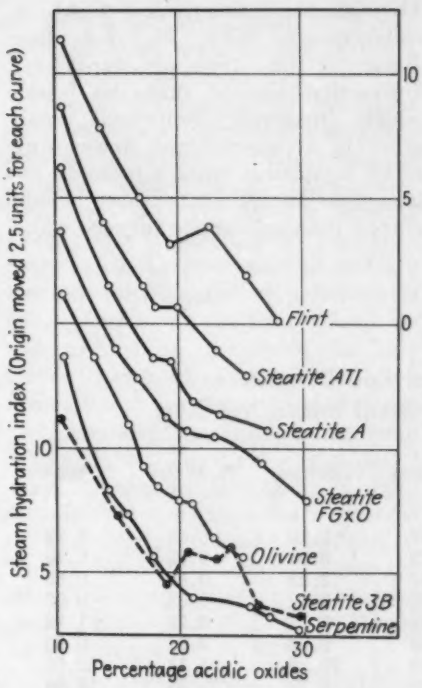

FIG. 5—Relation between steam hydration index and percentage of acidic oxides for clinkers prepared from dolomite and various silicates (after Rait and Green).

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effect of heating raw dolomite is the expulsion of carbon dioxide from the magnesium carbonate which yields a mixture of magnesium oxide and calcium carbonate (calcite). It is only at a later stage that the carbon dioxide in the calcite is driven off.

After the material has been fired it is picked over either on a conveyor belt or before shovelling into a truck. It is relatively easy to pick out the soft fired fraction both by appearance and density. This need not be thrown away but only conserved for certain purposes, for example, the basis bessemer, where a relatively soft fired dolomite is preferred.

The ceramic literature of the last 20 years contains numerous suggestions as to how dolomite can be stabilized or the lime fraction removed altogether. Certain methods suggested are almost fantastic; others although showing promise, fall short of being commercially feasible.

Perhaps the first really successful experiments on a work scale were made in Great Britain when in 1934 bricks consisting of a 75/25 mixture of dolomite and sudanite (magnesite plus talc) were found to give encouraging results in open hearth furnaces. The properties of brick made from these materials have been given by Tyler and Rees (see bibliography in Part Two of this article).

Although modern brick is made with a serpentine addition instead of sudanite rock, and big improvements have been made in the methods of clinker production, grading, pressing, drying and firing, the general type and composition of all the stabilized dolomite brick now in use in Great Britain are essentially similar to those made in 1934. This first brick was made by

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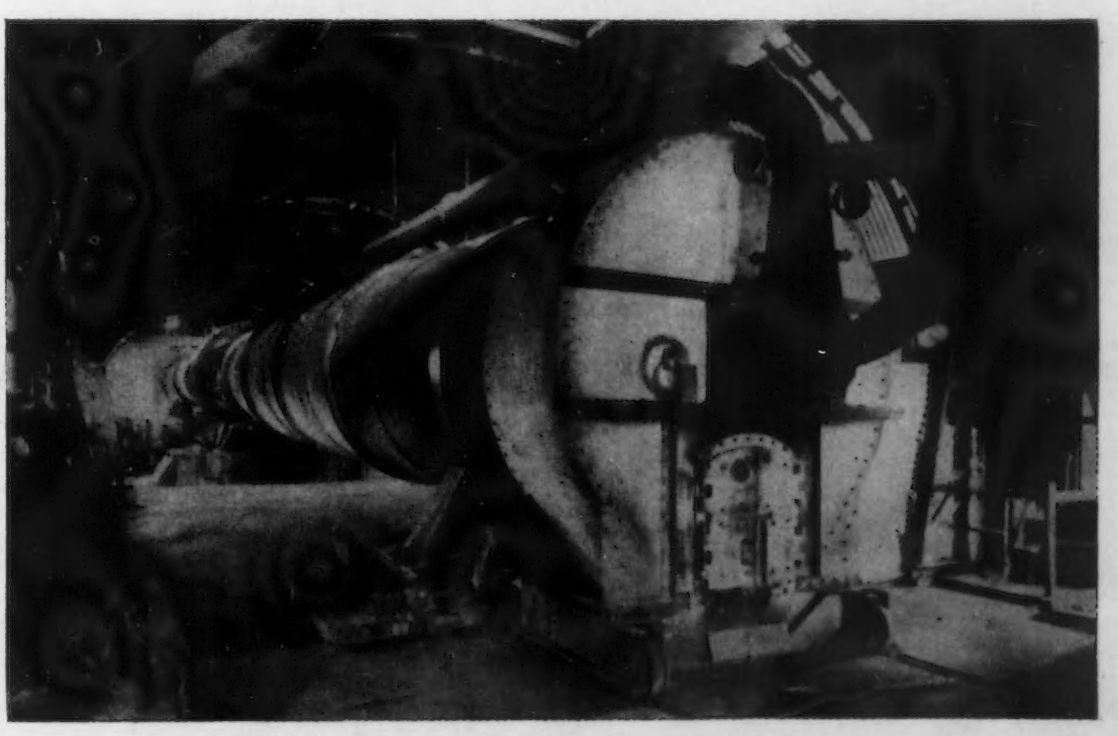

FIG. 6 — Rotary kiln used for the production of stabilized dolomite clinker.

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firing clots of suitable composition, followed by re-grinding, pressing in a small hydraulic press and firing in a baby kiln. They showed serious brick to brick variation and periodically suffered from hydration in storage or dusting in service.

In February, 1936, Dr. A. H. Jay of the Central Research Department (United Steel Companies, Ltd.) in collaboration with Sir Lawrence Bragg, F.R.S., then of Manchester University, showed that the bricks which hydrated contained small amounts of uncombined lime owing to an insufficient silica content or inadequate firing, while those which dusted (like an electric furnace white falling slag) after use in the open hearth contained considerable amounts of γ dicalcium silicate (see Fig. 4). This work emphasized the necessity of adjusting the chemical composition so that all the lime was combined, but no unstable dicalcium silicate was present. It was therefore decided that the composition should be such that the principal constituents in the clinker were tricalcium silicate and magnesia, the reactions involved being essentially as follows:

$$6(CaCO_3.MgCO_3) + 3MgO.2SiO_2.2H_2O. \underset{\text{dolomite}}{} \underset{\text{serpentine}}{}$$
$$2(3CaO.SiO_2) + 9MgO + 2H_2O + 12CO_2.$$

It is considered safer to operate slightly on the silica rich side of this composition which means that the brick contains a small amount of β dicalcium silicate. Since this might otherwise invert, a small proportion of one or more of the known stabilizers is added to the batch.

More recently this subject has received thorough study by J. R. Rait and co-workers and also by Gilbert Seil and his staff. Both these groups have made systematic studies of the progress of stabilization starting with raw dolomite or lime and adding increasing amounts of such materials as serpentine, olivine, iron oxide, zirconia, etc. A typical set of results obtained by Rait and Green are given in Fig. 5, and in Table II. Thus with the serpentine it was found that 15 per cent must be added before the free lime content (both calculated and actual) fell to zero. A very useful contribution to the subject has been made by Seil and his staff in the preparation of a bibliography containing brief abstracts of all the principal work on the orthosilicates of the alkaline earths.

In actual practice the materials are first wet ground in a tube mill and passed to a slurry tank where they are kept stirred until fed into the top of a rotary kiln (Fig. 6). The firing zone of the kiln was originally lined with magnesite brick but special dolomite-magnesite brick has recently been used with marked success. The kiln is fired with pulverized coal and attains a temperature in excess of 2912 deg. F. As the slurry passes through the kiln it first loses water, then carbon dioxide from the dolomite. From then on reactions occur which eventually lead to the formation of tricalcium silicate and magnesia, together with some glass and traces of other minerals. If the temperature in the firing zone is particularly high, the pea size particles tend to grow and may even yield balls of clinker several inches in

Table I

Selected Analyses of Raw Dolomite
(Geological Survey Report, Great Britain, Vol. XVI)

	Derbyshire	Yorkshire	Durham	N. Wales	S. Wales
Insoluble Residue	0.34	0.47	0.20	0.05	0.78
SiO_2	0.09	0.22	0.06	0.06	0.10
Al_2O_3	0.76	1.37	2.22	0.82	0.65
Fe_2O_3	0.01	0.38	0.12	0.33	0.02
FeO	0.39	0.42	0.17	0.08	1.19
MnO	0.05	0.04	0.04	0.04	0.03
CaO	30.25	29.50	30.84	31.11	32.05
MgO	20.83	21.02	19.72	20.35	18.54
H_2O at 221 deg. F.	0.03	0.05	0.04	0.11	0.10
H_2O above 221 deg. F.	0.26	0.22	0.82	0.58	0.47
SO_3	0.61	0.99	0.17	nt. fd.	0.23
C	0.01	0.04	0.04	0.03	0.07
CO_2	46.43	45.84	45.75	46.63	46.01

Table II

Comparison of Calculated and Determined Free Lime Contents
(Rait and Green)

Composition of Mix		Percentage Free Lime	
Percentage Dolomite B	Percentage Stabilizer	Calculated	Determined
100		29.64	28.40
96	4 flint	8.36	8.26
95	5 steatite A. T. I.	18.12	16.28
96	4 steatite A	15.64	16.46
92	8 steatite A	4.04	4.39
95	5 steatite F. G. X. O.	17.41	18.16
90	10 steatite F. G. X. O.	5.75	5.88
95	5 steatite 3B	14.51	16.40
92	8 olivine	8.89	8.18
90	10 olivine	5.03	5.09
95	5 serpentine	18.60	19.16
93	7 serpentine	14.37	14.65
90	10 serpentine	8.15	7.00
85	15 serpentine	0.0	0.0

Table III

Source of Basic	Range Over Five Years, 1933-1938						
	Loss	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	S
Derbyshire and Nottinghamshire	0.5 to 2.0	2.7 to 3.5	1.6 to 2.4	1.7 to 2.5	53.9 to 59.0	35.1 to 38.2	0.07 to 0.11
Yorkshire	0.5 to 2.0	2.5 to 3.1	1.7 to 2.0	1.9 to 2.2	54.2 to 56.0	36.0 to 38.2	0.05 to 0.08

diameter. The red hot material leaving the bottom of the kiln passes through a cooler and thence via elevators to the crushers. The crushed product is mechanically sieved, and the sieved fractions are stored in steel hoppers.

Other stabilizers have been employed, for example iron oxide, but have not achieved any great commercial success due to various limitations. Thus with iron oxide the clinker has a relatively low softening range.

Properties

A vast amount of work has been done on the properties of basic since the war began, but the present account will be limited to the more elementary aspects of the problem.

Basic, as it is delivered, varies considerably in bulk density. Thus individual lumps may have a density as low as 1.8 or as high as 3.0 grams per c.c. A typical figure is about 2.6 to 2.8. It is obvious that where such wide variations exist quality control can be set up only after careful studies have been made of the variations both within a truck and from truck to truck.

The analysis of the material from any given source is fairly constant, the data in Table III being typical.

The main variation is in the loss on ignition which tends to be higher with soft fired material due to rapid hydration after calcination.

The factors controlling hydration have been the subject of a great deal of work. It is obvious that grain size, moisture content in the atmosphere, and time will all have a marked effect. Over a long period the magnesia in the basic would also hydrate but the initial cause of perishing is the hydration of the lime phase. In this connection it should be emphasized that fineness in basic does not necessarily mean hydrated material. Certain types of crushers used in the production of fettling material may, either accidentally or intentionally, produce considerable amounts of dust, but provided this fettling is used before it becomes seriously hydrated, its properties may be even better than those of a uniformly sized material.

X-ray examination offers by far the best method of studying the constitution of clinker, but where it is desired to demonstrate the presence or absence of small amounts of free lime (less than 2 per cent), other tests, notably White's test and the glycerol test, are preferred. In White's test a small amount of finely ground sample is placed on a glass slide and wet with a solution consisting of five grams of phenol dissolved in five c.c. of nitro-benzene with the addition of two drops of water. The slide is then examined between crossed nicols using a magnification of about 150. The presence of free lime is shown by the formation of long, highly birefringent needles which radiate from the free lime particles. Where the lime content is high these crystals appear almost immediately and where it is low it may be necessary to leave the slide for an hour or so after preparation.

Details of the method used in carrying out the glycerol test have been fully described by B. Bakewell and G. E. Bessey in a D.S.I.R. Building Research Special Report (No. 17). As Table II shows, there is a close correlation between the amount of free lime expected from equilibrium considerations and that actually determined by the glycerol test.

Like basic, stabilized clinker can vary appreciably in bulk density, and it is generally considered that an average figure of at least 2.4 grams c.c. should be obtained for clinker of the type here described.

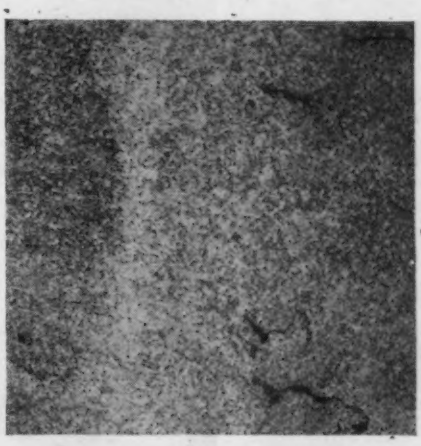
Editor's Note: Next week the author concludes this study with a description of the manufacture and properties of dolomite and composite dolomite brick and a discussion of applications.

Weld Cracks Minimized by Preheating

A COMMON misconception among welding fabricators is that plain carbon steels can be satisfactorily welded under any and all conditions without preheat. Welding engineers have learned from experience that this is not true, and that preheating is an all-important insurance factor if cracks are to be avoided.

Plain carbon steels of welding quality are defined as containing up to 0.35 per cent carbon. The higher the carbon content the harder the steel becomes in the weld and in the heat-affected zone. This obviously lessens the ability to deform and thus increases the danger of cracking. The presence of manganese also exerts a similar hardening influence, it being roughly 1/7 as potent as carbon in this respect. Frequently, also, plain carbon steel contains accidental alloying elements which increase its hardening tendencies.

When welding, it must be borne in mind that the more rapid the rate of cooling, the greater the risk of crack formation. Some of the factors that favor rapid cooling and therefore increase the danger of cracking are: a rapid rate of welding, a small electrode diameter, a small welding area in a relatively large mass of adjacent metal and a low atmospheric temperature. Preheating is therefore highly desirable at all times as a means of minimizing these adverse factors; and in cold weather preheating becomes an imperative precaution in welding all steels.

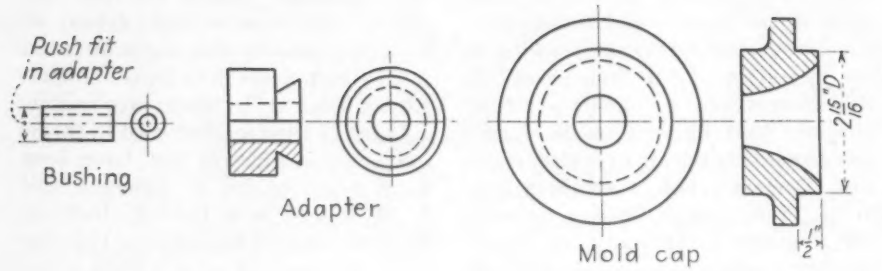


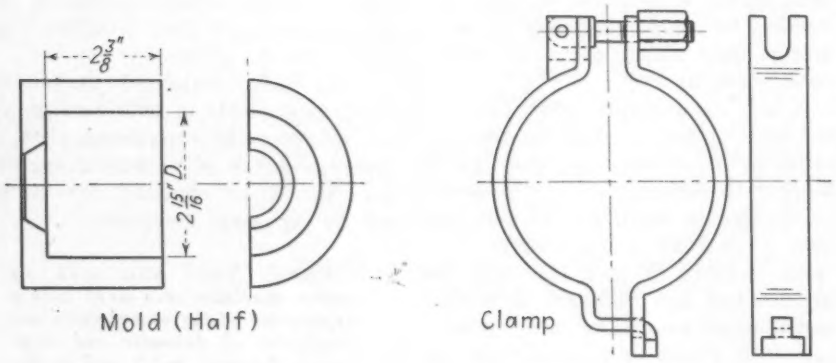
PHOTOMICROGRAPH at 25X showing microcracks developed in plain carbon steel (0.20 C and 0.65 per cent Mn) after welding without preheat. When the same material was preheated with a gas torch to 200 deg. F., a homogeneous weld structure was obtained, free from cracks.

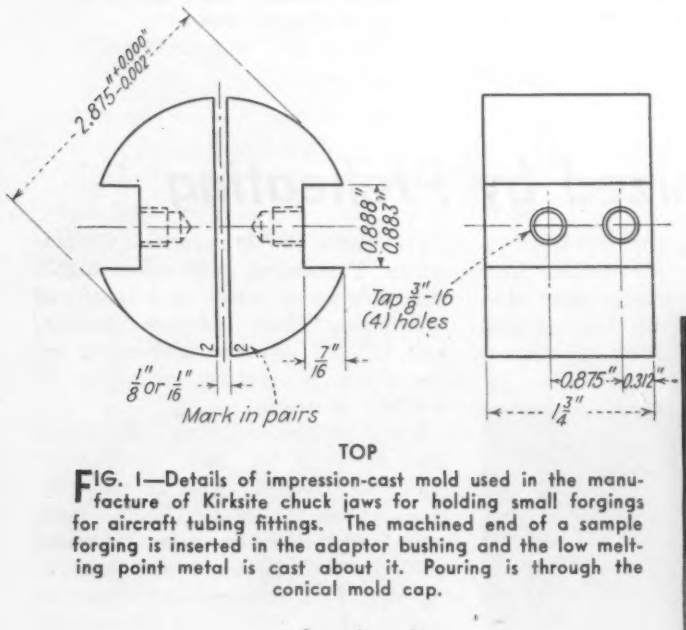
The photomicrograph illustrates the presence of fine microcracks which occurred in welding two sections of carbon steel 1½ in. thick with ¼ in. electrodes. When the same plain carbon steel was preheated to 200 deg. F., a homogeneous structure was obtained, free from microscopic cracks.

Preheating was accomplished by means of a gas torch. The temperature was controlled by making a crayon-mark on the plate with a Tempilstik 200. When the surface temperature reached 200 deg. the crayon-mark melted to a liquid smear. Heating was then discontinued and welding was begun. When the Tempilstik smear solidified (signaling that the temperature had dropped below 200 deg.) more heat was applied.

Impression-Cast Chuck J







TOP

FIG. 1—Details of impression-cast mold used in the manufacture of Kirksite chuck jaws for holding small forgings for aircraft tubing fittings. The machined end of a sample forging is inserted in the adaptor bushing and the low melting point metal is cast about it. Pouring is through the conical mold cap.

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ABOVE

FIG. 2—Details of a pair of jaws for attachment to a two-jar air chuck. The workpiece cavity is not shown. It would correspond to the particular forging to be held.

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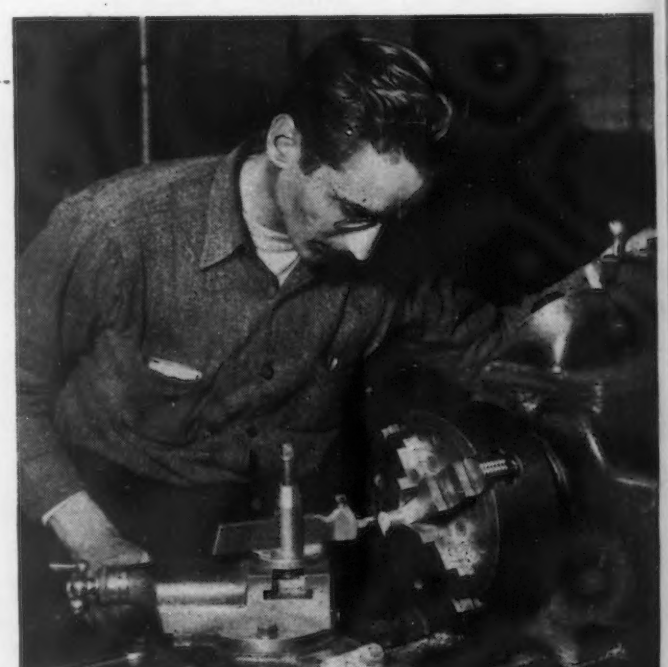
RIGHT

FIG. 3—Turning and facing one end of a T-connection forging which will be used to form the work cavity in an impression-cast mold. The o.d. must fit the adaptor bushing, Fig. 1. The face is scribed with a line parallel to the other leg of the T.



CAST metal chuck jaws to hold odd-shaped parts for machining operations have been used at some time or other by most shops. Usually they are made of brass, bronze or cast iron and generally a certain amount of cavity finishing with highly skilled labor is necessary to make them usable. Users of jaws cast in lead, babbitt or fusible alloy have found them limited for high production because of the lack of durability.

Over a long period of time, American Screw Products in the manufacture of forged hydraulic fittings, followed the common practice of machining the jaws out of steel. The procedure was naturally slow, expensive and efficient only with skilled labor. In an effort to comply with the WPB's request for greater production, experiments were made wth a commercial type of fusible alloy cast around the forging and subsequently separated into two parts or jaws. The need of harder and more durable material led to the development of jaws cast from Kirksite "A," a zinc-base alloy widely used for drop hammer dies in the aircraft industry.

The system of making these jaws

k Jaws

. . . Special chuck jaws for holding forged aircraft tubing fittings can be made by casting Kirksite "A" alloy about a sample forging, then machining the jaws out of the slug.

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By H. F. LENZ
Chief Engineer
American Screw Products
Los Angeles

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Operation Sheet for Chucks

(1) Turn and face one end of sample forging.
(2) Insert turned end in mold adapter bushing.
(3) Preheat mold.
(4) Pour Kirksite alloy around sample forging in mold.
(5) Turn o.d. of Kirksite slug and square one end, holding protruding end of forging in collet chuck.
(6) Face other end to length, holding slug body in three jaw chuck.
(7) For adaptation to oversize collets, drill and counterbore four holes for ¼-in. socket head screws.
(7A) For adaptation to two-jaw air chucks, mill two ⅞-in. wide slots in body.
(7B) Drill and tap two ⅜-in. holes in each milled slot.
(8) Saw slugs in half, using ⅛ or 1/16-in. milling saw.
(9) Knock out sample forging halves (scrap), mark identification.
(10) Tape halves together, and place in tool crib.

on a production basis has revolutionized the machining of such forgings in this plant. Believing that a tremendous number of man-hours can be saved by its introduction into other plants, the management of American Screw Products is making public the procedure. To further this purpose, engineering service and data are freely offered to those interested.

The system was developed by close cooperation between the engineering department, Rudy Rosenow, superintendent, and his assistants, George Erkelens and Joe Durgin. Its value lies in its universal adaptation to the various types of clamping fixtures, chucks, oversize collets and vises used throughout the shop on such machines as multiple-spindle automatic chucking machines, wire-feed screw machines, turret lathes and drill vises.

Two sizes of jaws, 2⅞ and 4 in. o. d. accomodate practically all of the hydraulic fitting forgings processed. Made in sets of five pairs they can be used on automatic chucking machines for long runs. If a short run is needed, any set can be mounted on two-jawed air-chucks, Barker wrenchless chucks or on special oversize collets of American Screw Products design. If a drill-press operation is needed the jaws are mounted in an air-operated vise (see Fig. 10).

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FIG. 4—Pouring the molten Kirksite "A" into a row of preheated molds (See Fig. 1). Underneath the special stand is a gas pipe with slit orifices for preheating. The latter operation is done while the permanent molds are laid on their sides. Melting pot and pyrometer are seen in the background. Pouring temperature is 820 deg. F. A clamp holds the two halves of the mold together.

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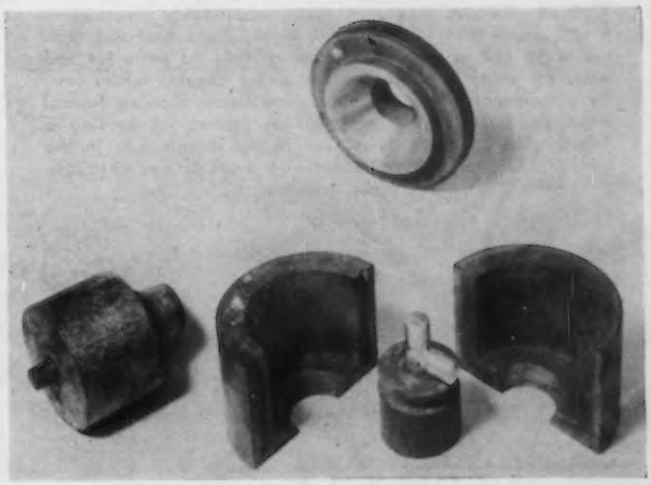

FIG. 5 — (Left) Solid slug as it comes from the mold. In between the split halves of the mold is the sample forging (center) held in the adaptor bushing. Before the machined end of the forging is pushed into the adaptor, the whole piece is sprayed with a graphitic separator.

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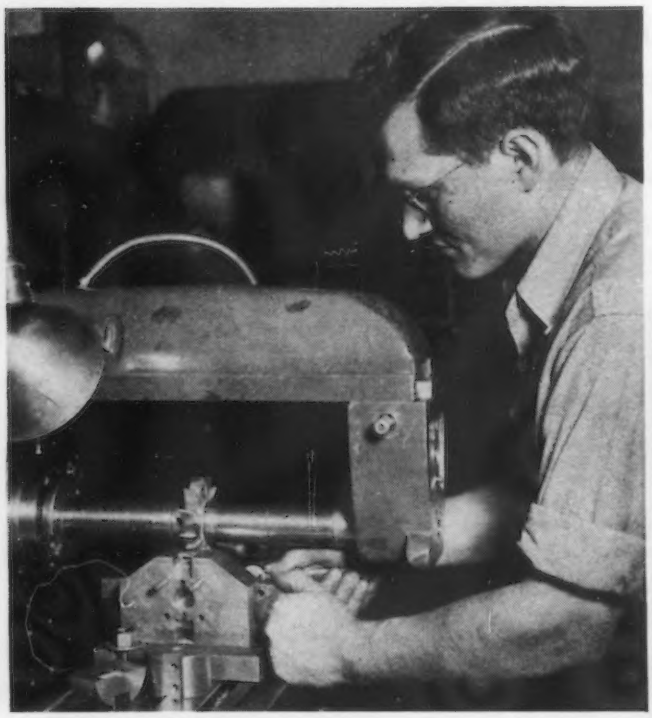

LEFT

FIG. 6—Milling the slots in the side of a chuck body corresponding to that shown in Fig. 2. The same fixture is also used for holding the slug during the slitting operation. For L and T-fittings to be held in jaws for oversize collet chucks (no milled slots required), a line is scribed on the faced end of the sample forging parallel to the other leg to direct the separation of the Kirksite casting into halves. Prior to milling, the slug is turned on the o.d. and the ends are squared. For this work, the machined end of the sample forging is held in a collet chuck.

ABOVE

FIG 7—Drilling the mounting holes for two-jaw chucks. Later these holes will be tapped.

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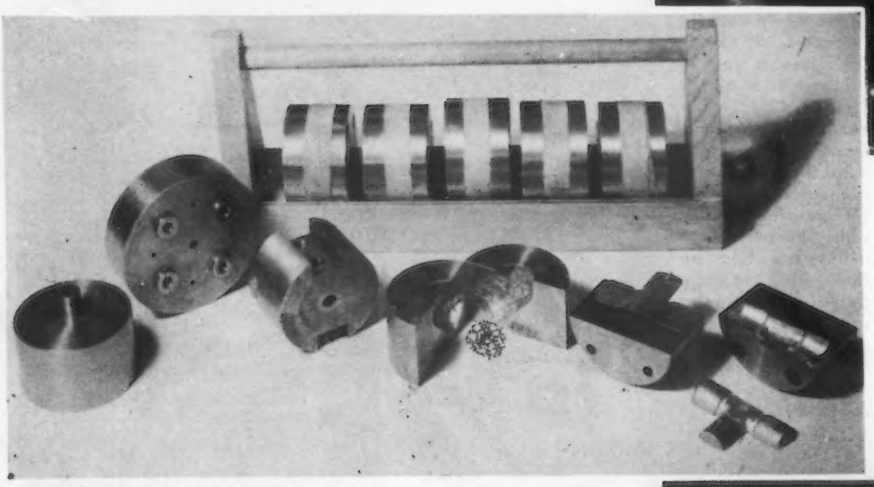

ABOVE

FIG. 8—Various stages in the production of impression-cast chuck jaws. From left to right: Solid cast slug with machined end of forging protruding; drill jig plate for end holes for adaptation to oversize collet chucks; set of jaws for attachment to two-jaw chuck; jaw halves showing typical impression-cast cavity, and two jaw halves for holding a T-joint. The split sample is seen in the foreground. In the background is a wooden carrier with a set of five cast jaws taped together.

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RIGHT

FIG. 9—Adaptation of cast jaws to the false jaws of a Barker wrenchless chuck on a turret lathe.

The so-called "beginners" class of labor can be used on all operations and a pair of jaws can be completed in 50 min. With division of labor, a set of five pairs of jaws can be made in approximately 3 hr.

Essentially, the process consists of casting the Kirksite alloy in a permanent mold (Figs. 1 and 4) about a sample forging blank which has been machined at one end, Fig. 3. This leaves a solid, cylindrical chuck body with the machined end of the forging protruding. It provides a finished surface for chucking the assembly while turning and facing the Kirksite body. In some designs (see Fig. 2) the body must be milled out to fit the jaws of a two-jaw air chuck or special false jaws. In another design, four holes are drilled and tapped in the end of the body for ¼ in. socket head screws for adaptation for oversize collets. The slug is then sawed in halves. The split parts of the sample forging are knocked out, the halves are marked and after being taped together are sent to the tool crib in suitable wood containers as shown in Fig. 8. The illustrations show the equipment used and the various steps in the manufacture of these chuck jaws is detailed in the table.

The company has found that operators and set-up men prefer this type of jaw to the old machined kind. Since they require no shimming or adjusting and with the work rigidly held due to the large area of contact, they product superior work. With the best toolmaking skill, conventional steel jaws can rarely be set up ready to go without losing valuable productive time. The impression-cast jaws can be mounted very quickly and the forging will run true. This makes possible a machining allowance on the forging of only 1/16 in. on the diameter instead of the not uncommon allowance of 3/32 or ⅛ in. A set of Kirksite jaws is good for 8000 to 10,000 operations without loss of accuracy. Rapid and economical jaw replacement makes this process a marked advance in shop practice.

American Screw Products is now experimenting with a design of mold which will cast the jaws completely cored, slotted and sized so that splitting into halves will be about the only operation necessary to prepare the jaws for use.

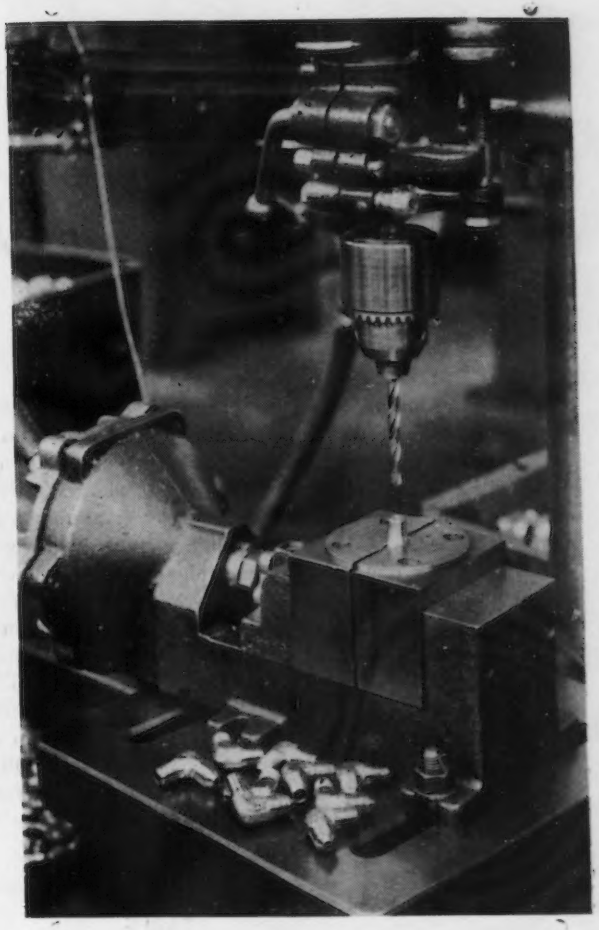


FIG. 10—Use of cast jaws in an air vise on a drill press. This makes an efficient fixture for drilling elbows since positive location of each forging is assured.

New High Impact Molding Plastic

BAKELITE CORP., unit of Union Carbide & Carbon Corp., has announced the development of a new high impact-resistant molding material, BM-16468. It is a black phenolic plastic having a string filler, rather than chopped fabric which is employed for other types of shock-resistant materials. Impact strength of BM-16468 is said to be about 20 to 25 times greater than general-purpose phenolics.

Molded test specimens indicate the materials have the following physical properties:

	Direction of Stress	
Compressive strength, lb. per sq. in.	Parallel	27,500 to 32,700
	Transverse	15,600 to 18,200
Tensile strength, lb. per sq. in.	Transverse	7,500 to 58,00
Flexural strength, lb. per sq. in.	Parallel	12,000 to 12,900
	Transverse	10,200 to 14,200
Maximum deflection, in.	Parallel	.086 to .122
	Transverse	.095 to .118
Impact strength, Izod Energy to break, ft.-lb. per in. of notch	Parallel	3.49 to 4.84

Shaved Gears for A

THE major objection to shaving gears in the aircraft industry seems to center around the probability of distortion during heat treatment subsequent to finishing the gear tooth form. Considering distortion rather as expansion, sometimes uniform and sometimes non-uniform, a method of control suggests itself. Heat treating procedure can be changed to make it more uniform and an allowance introduced to compensate for the uniform expansion in cutting the gear originally.

During the development of the 1937 Chevrolet transmission a series of checks was made on transmission gearsets to determine whether the volume change during heat treatment was a uniform expansion. Production gears made of SAE 5145 steel were hardened by immersion in a cyanide bath at 1490 deg F. for approximately 12 min. and then quenched in oil. Development gears made of SAE 4815 steel were carburized at 1675 deg. F., cooled in the box, reheated to 1470 deg. F. and quenched in oil.

The involute form of the gears was charted before and after hardening. The change was then converted into a corresponding change of base circle diameter and compared with the change of other gear elements. The expansion rates are shown in the chart, Table I.

TABLE

Expansion Rates During Heat Treatment of Passenger and Commercial Transmission Gears

	Passenger 5145 Steel	Commercial 4815 Steel
Clutch Gear		
Base Circle	+.0010	−.0011
Dimension over gage blocks	+.0010	+.0012
Dimension over rolls in clutch teeth	+.0007	+.0007
Bearing Diameter	+.0010	−.0002
Bore	+.0006	−.0040
First and Reverse Gear		
Base Circle	+.0011	−.0002
Dimensions over rolls in teeth	+.0010	+.0011
Dimension between rolls in spline	+.0016	+.0001
Width	+.0022	−.0002
Second Speed Gear		
Base Circle	+.0012	−.0018
Dimension over gage blocks	+.0014	+.0011
Dimension over rolls in clutch teeth	+.0011	+.0006
Length	+.0012	−.0007
Outside Diameter	+.0012	−.0007
Bore	+.0009	−.0033
Countergear		
27 tooth base circle	+.0010	−.0016
Dimension over gage blocks	+.0011	+.0006
15 tooth base circle	+.0011	−.0011
Dimensions over rolls in teeth	+.0010	+.0007
22 tooth base circle	+.0010	−.0010
Dimension over gage blocks	+.0010	+.0010
Outside Diameter	+.0013	−.0008
Length	+.0010	−.0010
Bore	+.0005	−.0031
Idler Gear		
Base Circle	+.0012	−.0010
Dimension over rolls in teeth	+.0011	+.0006
Diameter between gears	+.0009	−.0011
Length	+.0010	−.0010
Bore	+.0009	−.0037

While it will be noted that all elements of the SAE 5145 steel gears did not expand uniformly, it can be seen that the change in the tooth form is part of the general expansion of the gear during heat treatment. We believe that changes in the holding fixtures used during heating and quenching to control the cooling rate of the gear would have resulted in a uniform expansion. However, since the gear teeth themselves expanded quite uniformly, we felt that changes to control the other elements were not justified. On the basis of these results, confirmed by numerous spot checks at both plants manufacturing these gears, an allowance for expansion during heat treatment of + 0.0010 in. was established for the SAE 5145 steel gears.

The fact that aircraft engine gears are normally carburized only locally and the case depth more closely controlled will probably make them expand more uniformly. Expansion data on the tooth form of one gear for aircraft engine use that is shaved and carburized is shown in Fig. 1. This impeller shaft gear at the left has 26 teeth of 11/13 diametral pitch. The vertical points on the tooth chart indicated are the lowest point of contact with the mate, the pitch line and the tip of the tooth. This gear is being shaved in production on a rotary shaver, carburized in a gas carburizer and hardened in an electric furnace. The bulge near the pitch line is characteristic of carburized gears and confirms the variation in expansion rates given in the table. It tends to relieve the tooth load at the tip of the gears and is not detrimental to their operation if not excessive. The expansion rate of this gear tooth is — 0.0006 in.

The gear on the right was handled by the same procedure but showed entirely different expansion characteristics. This, we believe, was due to the change in section and the re-

Aircraft Engines

By A. W. HARRIS
Chevrolet Motor Division, General Motors Corp.

. . . Today, the War Department is asking industry to use gear shaving wherever practical for the manufacture of aircraft engine gears. About 12 years ago shaving was adopted for finishing automotive transmission gears in order to get a smoother tooth contact and to eliminate the matching of gears by decreasing variations in tooth form. This time the change in procedure is for the purpose of relieving an expected equipment shortage by spreading the requirements over more types of machines. This report, originally presented as a paper before the Society of Automotive Engineers in April, details some of Chevrolet's experience in shaving transmission and aircraft gears and points out some of the problems to be encountered.

sultant change in cooling rate. A fixture designed to quench the tooth elements of this part at the same rate as the other should change its expansion rate from — 0.0020 to — 0.0006 in. While there is a difference in material, one being AMS 6240 and the other 6294, this is not believed to influence the rate materially. This second gear is at present being finished on a grinder.

Preliminary data collected for the development of shaving cutter forms show a range of expansion rates from — 0.0003 to — 0.0012 in. on the teeth of six different gears investigates. The sections of these gears are comparable to that shown at the left in Fig. 1.

Development of Fillet Contours

Another objection to shaving frequently expressed is the probability of highly concentrated stresses due to cutter marks and the line of demarcation between the hobbed and shaved contour in the tooth fillet.

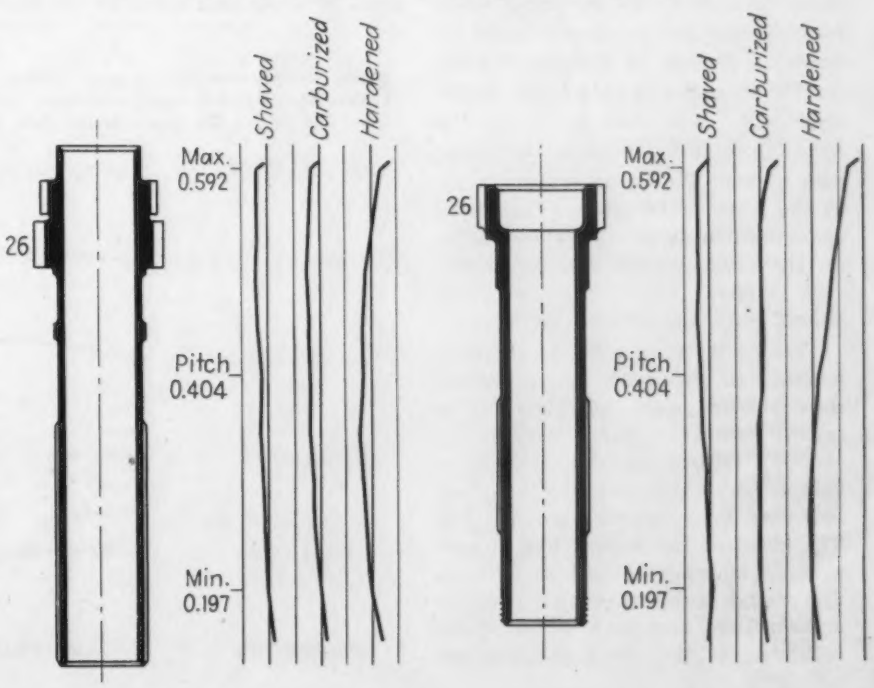
Early in our experience with shaved automotive transmission gears we were called upon to increase the strength of a 14-tooth pinion pinion driving a 33-tooth gear. Since a higher gear ratio was also desired, we substituted a 13-tooth pinion cut out of the same blank and mating with the same 33-tooth gear. As well as getting the increased strength and ratio desired, an unanticipated advantage was obtained. The heavy tip contact we had been perpetually fighting on shaved gears virtually disappeared.

The subsequent Chevrolet transmissions designed to be shaved incorporated dual pressure angles on the gears—a generating pressure angle and a higher operating pressure angle. This pemitted the involute form to be generated lower than the mating gear contacted without increasing the depth of the tooth. However, it did decrease the strength of the tooth by narrowing the base. This was compensated for by putting a large radius, tangent to both sides, on the tip of the hob. The result was slightly increased depth of tooth, but a stronger tooth than one designed by the usual procedure, due to the fact that the radius on the tip of the hob reduced the stress concentration at the base of the tooth.

This procedure was used in laying out hobs to be used prior to shaving of aircraft engine gears. While it is not a highly stressed gear, a 7-tooth oil pump gear was laid out in this manner and will serve as an illustration of the method. The tooth has been made shallower than standard to permit the use of a larger shaft. The nominal clearance over the tip of the mating gear is only 0.004 in.

This is a 6-pitch gear of 28 deg. pressure angle originally ground with

FIG. 1—Charts showing gear tooth expansion on aircraft engine impeller shafts during carburizing and hardening. The dimensions on the left of each chart are distances along the line of action from the point of tangency with the base circle. The spaces between adjacent vertical lines represent 0.0005 in.



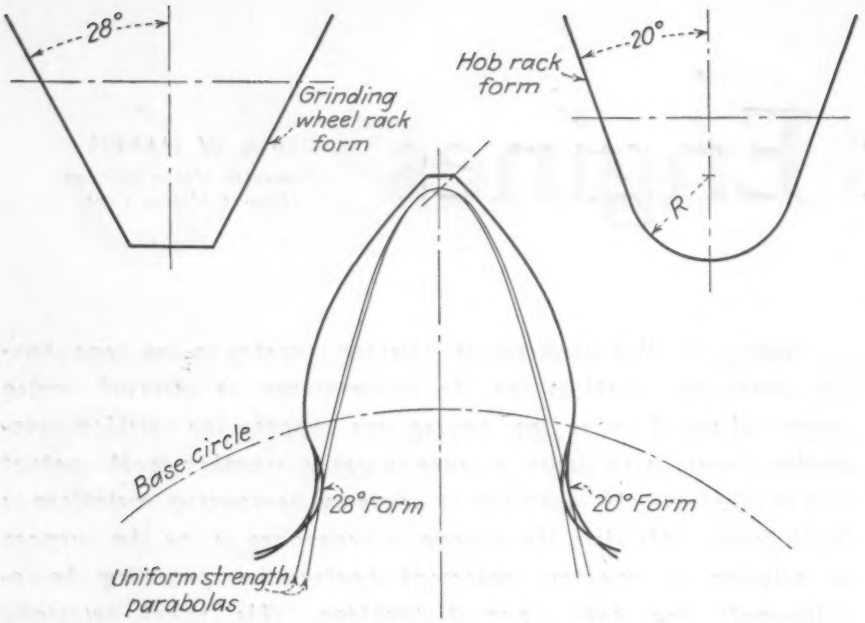


FIG. 2—Comparison of beam strengths of teeth generated with a 28-deg. rack type grinding wheel and with a special 20-deg. rack hob. The uniform strength parabolas are used in computing the Lewis Y factor.

a rack-shaped grinding wheel. The form of the tooth obtained is shown in Fig. 2. In the same diagram is shown the form of tooth laid out for hobbing prior to shaving to get the maximum strength and smoothest fillet possible. This form is developed by a 20-deg. pressure angle hob having the same normal pitch of 0.4623 in. as a 28-deg. pressure angle hob of the same form as the grinding wheel. To accomplish this change in pressure angle the diametral pitch is changed from 6 to 6.3856. The radius formed on the tip of the hob is 0.082 in.

As will be seen in the comparison made in Fig. 2, the resulting tooth form is stronger as demonstrated by Lewis Y factors of 0.063 and 0.069 for the ground and hobbed forms respectively. The rate at which the tooth form departs from the parabola governs the stress concentration at the point of tangency. The stress concentration is considerably higher on the form ground with a 28-deg. rack-shaped wheel than on that hobbed with the 20-deg. special hob.

This point of tangency is the only location on the tooth where serious consideration must be given to a smooth contour. Almost without exception, fatigue failures will start very close to the weakest point as indicated by a layout such as this. The blend of the hobbed and shaved contours is usually smooth enough and far enough away from this point to make special consideration of stress reduction at the blend unnecessary. For the hobbed tooth shown in Fig. 2 the blending occurs just below the base circle.

Development of Active Tooth Profile

The shaving process by itself does not produce the same gear tooth profile as grinding does. It is necessary to control the preliminary hobbed or shaped form to obtain a good shaved gear. In addition to remaining in the fillet and root of the finished gear, this preliminary form also has considerable influence over the active profile which is afterward shaved.

The graphs on Fig. 3 represent the types of error that occur in the gear before shaving and be only partially corrected. Success in correcting them in the shaving operation depends on slow cutter feed and rigidity of the gear support. Efforts to eliminate them entirely are best spent on the preliminary operations. The length of each graph represents one revolution of a 16-tooth gear. It is a combination of the involute profiles and the normal pitch spacing errors which will be found in checking the gear.

Hob eccentricity (A), gear eccentricity (C) and long normal pitch shown (D) are the easiest errors to correct in shaving to the point where they are not detrimental to the operation of the gear.

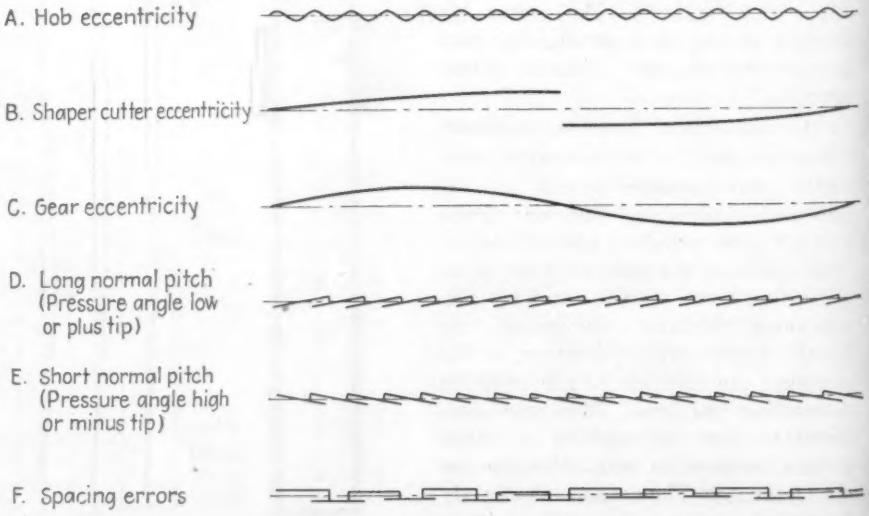
The effects of the shaper cutter eccentricity vary according to the portion of the cutter used for making the finish cut on the gear. In extreme cases it will give a decided spacing error at the point where the cut is completed. Elimination of this error is extremely hard to accomplish.

Long and short normal pitch errors shown in (D) and (E) are due to errors in the original cutters or a change in the cutting angle when resharpening. Short normal pitch is hard to correct by shaving because of the necessity for removing excess material at the root of the gear tooth. Erratic spacing errors (F) are due to errors in the cutters and are practically impossible to eliminate completely.

Burnishing and Scraping Action

A shaving cutter combines a burnishing and a scraping action. With a low crossed-axes angle, burnishing

FIG. 3—Characteristics of gear cutting errors that can only be partially corrected by shaving. Upward slopes represent acceleration when a standard gear is driven by one having the errors designated. Downward slopes represent deceleration.


A. Hob eccentricity
B. Shaper cutter eccentricity
C. Gear eccentricity
D. Long normal pitch (Pressure angle low or plus tip)
E. Short normal pitch (Pressure angle high or minus tip)
F. Spacing errors

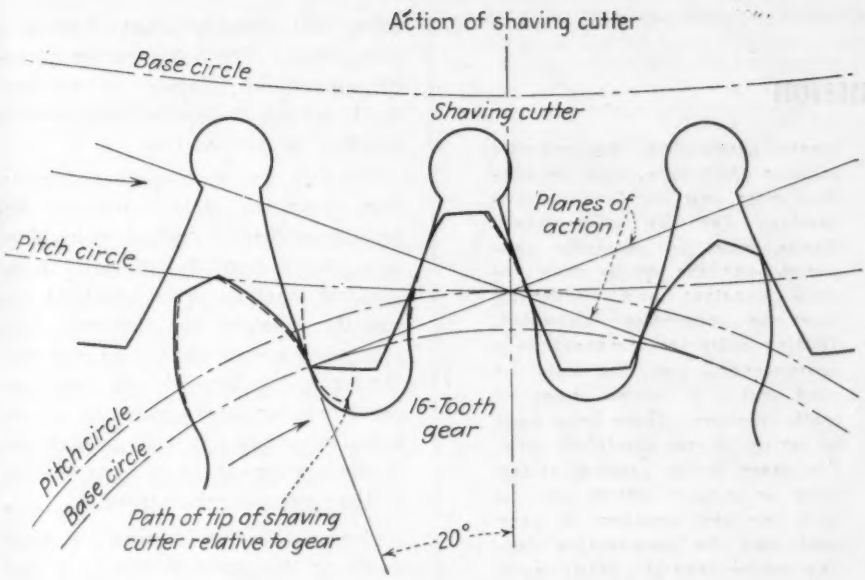


FIG. 4—Action of a shaving cutter on a 16-tooth gear in the plane of rotation. Dotted lines on gear teeth indicate where material is yet to be removed.

is predominant. With a high crossed-axes angle, scraping is predominant. With a pure burnishing action, the amount of material removed at any given point on the profile depends on the number of tooth surfaces in contact at the same time and on the amount of sliding action between the gear and burnisher. At the pitch line there is pure rolling action so that no material is removed. The sliding action increases with the distance from the pitch line. Burnishing will always leave a hump at the pitch line. This hump can be shifted by changing the burnisher size and altering the pressure angle, but not eliminated.

With a rotary type shaving cutter an increase in the crossed-axes angle increases the curvature of the cutter tooth surface in the plane of action and the unit pressure on the gear tooth. The sliding action lengthwise of the tooth is increased also with both rotary and rack-type cutters. As this angle increases, so does the cutting action at the pitch line of the gear, provided there are sufficient teeth in contact, until it finally balances the tendency for the burnishing action to leave a hump there.

We then have as variables to influence the cutting action, pressure angle, teeth in contact and crossed-axes angle. The pressure angle varies as the cutter is reground. The others can be constant.

Fig. 4 shows the action of a shaving cutter on a 16-tooth gear in the plane of rotation. The dotted line in the tooth space shows the patch of the shaving cutter tip as it comes into contact with the gear. It is this corner which gives the characteristic groove near the base of a burnished or shaved gear. The depth of this groove is reduced by hobbing the involute form deeper than the shaved form, either by the use of lower pressure angle hobs as previously mentioned or protuberance hobs.

Fig. 5 shows the contacts between the teeth of this shaving cutter and gear. These are shown along the plane of action and also along the tooth of the gear. The areas over which overlapping of teeth occur are shown graphically.

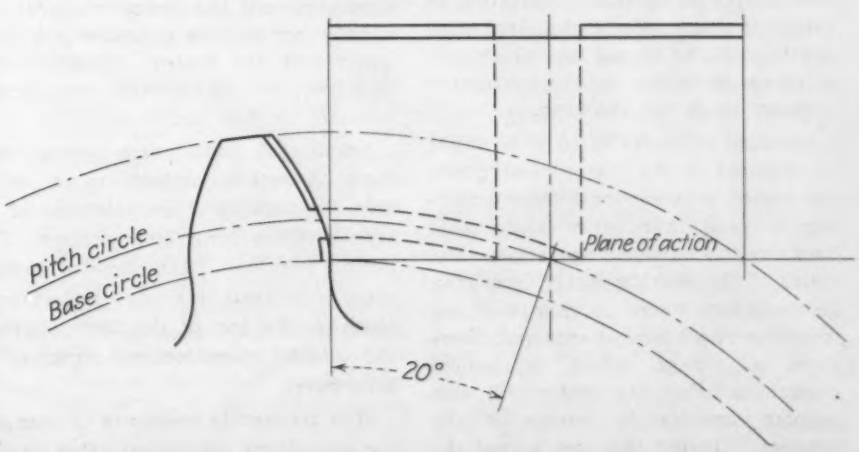
By comparison Fig. 6 shows the contacts between a shaving cutter and a 7-tooth gear. The overlap here is so slight that there is a powerful tendency for this gear tooth to take the form shown on the graph at the lower right. This graph was made from an actual gear which had 0.0015 in. shaving stock. Because of this tendency, as little stock as is practical should be removed by shaving from a gear of this type. If the involute form alone is considered, shaving a gear with only slight contact overlap is detrimental; but spacing and normal pitch errors are subject to correction by shaving.

Shaved and Ground Gears Compared

Good finished gears can be made by grinding or shaving. Both methods have certain inherent advantages that must be made use of and inherent disadvantages that must be compensated for to obtain the best gears. Strength and durability are not affected by the method of manufacture where proper controls are used. Attempts to speed up production of ground gears result in surfaces softened by the heat generated in grinding and the subsequent formation of grinding cracks if carried to an extreme. Luckily, the cracks developed in grinding teeth seldom follow along the base of the tooth. However, it is quite certain that the heat of grinding will produce surface stresses over that area whenever grinding cracks show up.

Since the quality of ground gears depends so much on the grinder operator, it is possible for them to vary from tooth to tooth and gear to gear. At a time when rapid expansion of production is called for and new operators have to be trained, this possible variation puts a heavy responsi-

FIG. 5—Contacts of a 16-tooth gear with shaving cutter analyzed along the plane of action and also along the tooth face of the gear. The partial full lines near the base circle and the pitch circle show the intervals over which there is also contact on the preceding and the following tooth respectively.



Discussion

THE controversy between shaving and grinding is not about which should be used, but whether or not shaving can be applied immediately, says Charles G. Pfeffer of Wright Aeronautical Corp., in discussing Mr. Harris' paper. The primary objection the aircraft industry has to shaving is that thorough tests must be made before such a departure from current practice can be placed in production. Many experiments are being conducted on shaved gears, especially such gears as pinions which are most closely related to automotive glass on which previous experience is based. The complicated forms of non-uniform section are the ones that will require the most experimenting.

Shaving possibilities of large internal gears of nitralloy are quite encouraging, Mr. Pfeffer states. On such gears, which can not be ground, shaving is being used as an added operation to produce a better gear before nitriding, with the expectation that subsequent finishing operations can be reduced.

It is quite agreed that shaving has many advantages, provided it meets production requirements such as uniformity, high production rates and simplicity of operation. On the other hand, blanks must be carefully prepared, machine setups must remain constant and hardening must be accurately controlled. Tooling costs are increased as a protuberance hob can only be used within a limited range of tooth numbers. These hobs must be set up to run absolutely true. For gears to be ground, rough hobs or shaper cutters can be used for any number of gear teeth and the preparatory cutting can be done at a fairly rapid pace.

Distortion after heat treat is not a matter of chemical analysis but of design and preparation. A more dependable indication of probable distortion is the measure of hardenability, but application of such control would require considerable expense and is quite impractical. That localized carburization would induce more uniform expansion is contrary to Wright's experience. This is governed by the rate of cooling which again is controlled by blank design.

bility on the gear inspection department. In contrast, the errors due to shaving are most likely to show up when the machine is set up on a new gear or cutter. Deterioration of the cutter is very gradual so that setup and periodic checks are sufficient to control the form of the shaved gear. However, successful shaving does depend on a blank that is more closely controlled than is required for grinding. This tolerance in favor of grinding is not as great as might be at first supposed, because a variation in grinding stock affects the final case depth and the speed at which the grinding operation can be performed without danger of checking.

Changes in material such as might be required in the present emergency are easier to incorporate when grinding is used than when shaving is used for the finishing operation. Revision of the shaving cutter form may be necessary where no change of the grinding wheel form is required. However, a change which is radical enough to affect the cutter will also require considerable testing of the product. During this test period the necessary changes in the shaving cutter can be established.

Our experience with shaving leads us to select first for that process gears which are small in diameter and have relatively heavy web sections centered under the tooth. The largest gears we are now shaving or are planning to shave in the near future are the 26-tooth gears shown in Fig. 1. Those in the process of development have 14 and 16 teeth. The larger gears with light sections that approach the designer's ideal of a halo mounted on a spider web are being left for future consideration. However, we are shaving some large involute splined couplings.

Small stub tooth gears having less than 1.3 teeth in contact are not suitable for shaving if maintenance of a true involute form is important. To permit shaving of this type of tooth, some manufacturers have left excess stock on the top of the teeth during the shaving operation and removed it afterward.

It is frequently necessary to change the operations performed after hardening considerably when shaving is introduced. The bearings must then be ground in relation to the gear teeth instead of grinding the teeth in relation to the bearings.

Shaving is a relatively high production operation which requires controls most readily applied where there is a steady flow of material. If the shaving machine setup must be frequently changed for different jobs, consistent results cannot be expected. Uniform conditions of heat treatment necessary for close expansion control are also maintained with greater ease if the equipment is in constant use at the desired temperatures.

Comparative production rates for finishing the gears shown in Fig. 1 are given below in pieces per hour:

Shaved Gear—Shave 20 on rotary shaver.

Shaved Gear—Lap teeth, 30 on internal lapper.

Shaved Gear — Recenter, 10 on grinder.

Ground Gear—Grind, 2.8 on gear grinder.

As long as the requirement for these gears is below 2.8 per hour, there is no saving in equipment, but as it gets above that figure, the shaving operation begins to show up more favorably. Since the shaved gear operations are being done without using the full capacity of the machines, there is probably considerable improvement yet possible by revision of the tooling. The following production figures for the automotive transmission gears listed in the table give some idea of what can be obtained from shaving:

Clutch gear, 63 on rack shaver.

First and reverse gear, 67 on rotary shaver.

Second speed gear 60 on rack shaver.

Countergear — Front, 70 on rack shaver.

Countergear—Center, 48 on rotary shaver.

Countergear — Rear, 70 on rack shaver.

Idler gear—Both ends, 44 on rotary shaver.

Our selection of aircraft gears to be shaved was made on the basis of quantity requirements and rigid sections. There are ten oil pump gears used to each engine which vary only in length and bore size. These variations can be taken care of by arbor changes and do not require any

changes in machine setup. The other gears being considered can be produced in some quantity because three similar gears in each case can be made with the same hobs and shaving cutters.

Conclusion

Most of the data given here are based on experience with automobile transmission gears, but we have no reason to believe it will not apply equally well to aircraft engine gears. Our test experience on the shaved impeller shaft gear shown in Fig. 1A (left) has not extended far enough to predicate the life of the gears. One gear has completed three model tests and part of a fourth. Another has completed a model test and an additional 100-hr. durability test at take-off power and speed. Several others have completed single model tests. None of these gears have shown any indication of failure.

Hobs only have been considered for preliminary operations where grinding is being replaced. Shaving can be used after shaping operations as well as after hobbing operations, but the fillet form control is not as easy with a shaper cutter as with a hob.

In the discussion of cutter action, the rotary type of shaver has been considered almost exclusively because the first cost of these cutters is much lower for each application than the rack type. The main advantage of the rack type of cutter is in the production of helical gears, which are not common in aircraft engines.

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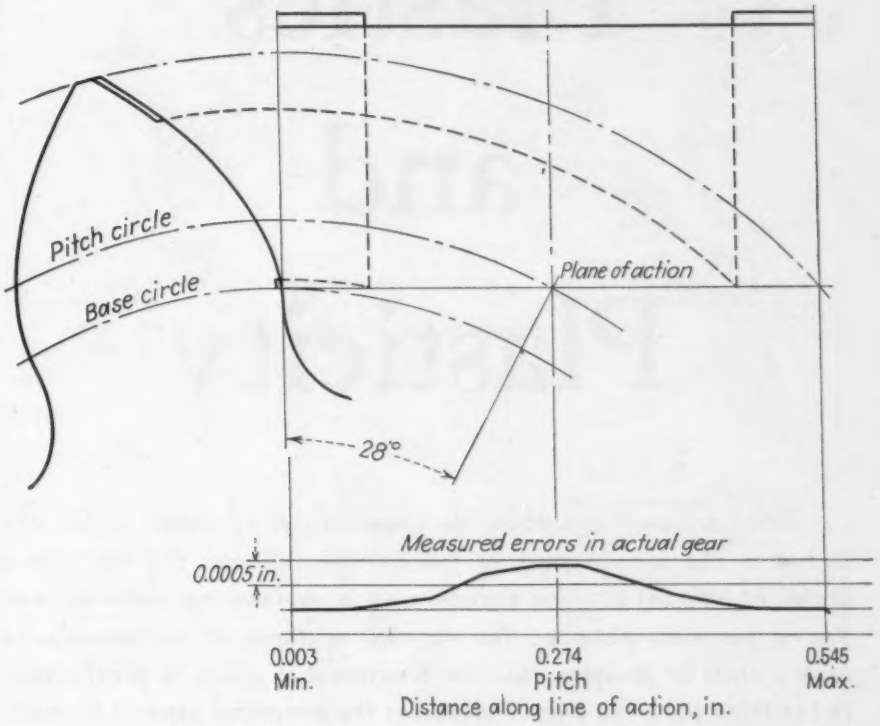
FIG. 6—Contacts of a 7-tooth gear with shaving cutter. Because of the lack of overlap compared with the contact conditions shown in Fig. 5, there is a tendency for the gear tooth to exhibit the variations shown by the graph in the lower right.



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Discussion

AIRCRAFT engine manufacturers have generally utilized grinding rather than shaving where hardness and extreme accuracy are desired, says A. Willgoos, of Pratt & Whitney Division of United Aircraft Corp., in discussing Mr. Harris' paper. He maintains that greater loading can be carried on the ground gears than on those finished by any process which does permit correction after hardening.

It should be pointed out, however, that any seeming reluctance to a blanket substitution of the shaving process for grinding on the part of the aircraft engine manufacturers has not been because of the method, but rather due primarily to the fact that these manufacturers have been equipped for gear grinding and have designed their gears around this process. Also a premium has been placed on complete interchangeability of parts where aircraft engines of a given design are being made by several different plants. The position has been taken, says Mr. Willgoos, that where gears could be manufactured by the shaving process and the size and the tooth forms maintained absolutely interchangeable, shaved teeth would be accepted as substitutes for ground teeth where the hardness was such that the teeth could be shaved after hardening. In the case of gears to be hardened after machining, it is believed good judgment to first submit such gears to proof before accepting them as a substitute for hardened and ground gears.

There are no grounds for controversy between the aircraft industry and the automobile industry on the matter of shaving versus grinding, says Willgoos. The policy of one aircraft engine manufacturer is summed up as follows:

1. Shaving is desirable where design rules out grinding of a hardened gear.

2. Shaving is desirable on gears which do not require hardening and where saving in time or equipment can be effected.

3. Shaving is acceptable on hardened gears where accuracy can be maintained and where production quantities warrant use of complicated quenching fixtures.

Plastics and Plasticity

By E. V. CRANE
Chief, Development Engineering Department, E. W. Bliss Co., Brooklyn

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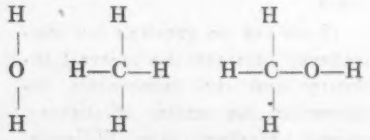
. . . After briefly highlighting the chemistry of synthetic resins, Mr. Crane in the second part of the article analyzes the half dozen states of internal bonding encountered in engineering materials and draws parallels between the various mixtures of compounds, be they metals or plastics. Similar treatment is given to plasticizers. In the third part, the author discusses the practical aspects of molding and forming of materials in their plastic state.

THE organic chemistry of synthetic resins is interesting in the multiplicity of ways in which a few elements, principally carbon, hydrogen and oxygen can be put together into different molecules, strings of molecules and mixtures of molecules. Of the three most common elements, an atom of carbon may be represented as holding out four hands to grip desirable associates, while hydrogen has only one hand and oxygen two. Thus molecules of water (H_2O), methane or marsh gas (CH_4) and methanol or wood alcohol (CH_3OH) may be represented respectively:



These are all satisfied atoms having no unoccupied hands. However, as the combinations become more and more complex some are found among the synthetic plastics which leave an unoccupied hand extending here and there for chemical attachment to reasonably attracive adjacent molecules. The methods of inducing molecules to string together, thus in chain form, has been christened polymerization. It is a great help in developing properties suitable to tubes, threads and rubbers. The natural molecule C_5H_8, isoprene, clasps hands in polymer groups of up to 4000 molecules, and the bigger the group is, the more elastic is the material.

Oriented Polymers

By the mechanical stretching, rolling or other directional working of materials made up of groups of such chains of molecules, the mechanical properties are advantageously effected as in the production of nylon thread. Interesting illustrations of vinylidene chloride polymers presented by Coggin and Lowry[11] are shown in Figs. 11 and 13. In Fig. 11 they indicate that the lining up or orientation of chains accomplished by a 400 per cent elongation or equivalent 80 per cent reduction in area increased the tensile strength of the material in the neighborhood of 400 to 500 per cent. Fig. 12 represents the increase of strength of small section filaments as they are stretched. Comparison of the sharp rise at the end of the curve with those for copper,[12] and for aluminum,[13] suggests strain-hardening in the mechanical working of the oriented crystal chains.

X-ray diffraction studies of Saran, Fig. 13, show at *A* the random light distribution of the material in the amorphous or thermoplastic state, at *B* the ring distribution of the general crystal structure and at *C* the crystal pattern of the oriented structure. In connection with these illustrations of increasing directional strength by orientation, it is interesting to refer back to metals again. In metals, the force to pull two atoms or molecules directly apart is far higher than familiar tensile strengths, whereas the force to cause diagonal slippage along planes of weakness between layers of atoms in orderly crystal pattern becomes less and less as boundary interferences are eliminated. Thus, a ½-in. bar of copper annealed to the state of a single crystal may be bent in the two hands. But, cold worked to the upper end of its plastic range, its yield point rises above 60,000 or 70,000 lb. per sq. in. A 0.15c. steel with an annealed yield point of 55,000 p.s.i. or less may be cold worked to a yield point over 110,000 p.s.i. In wire drawing such a steel,[14] the directional working, in the presence of work generated heat (which may readily bring the whole small section up into the thermoplastic recrystallization range) apparently results in a combination of preferred orientation and strain hardening, bringing the tensile strength (and yield point) up in the neighborhood of 250,000 p.s.i.

Among engineering materials it seems wise to distinguish the half dozen states of internal bonding with which we must deal:

[11] "Vinylidene Chloride Polymers," W. C. Goggin and R. D. Lowry, American Chemical Society, 3-18-42.

[12] Fig. 123. Plastic Working of Metals, second edition, by E. V. Crane, John Wiley & Son, Inc.

[13] Fig. 124. Ditto.

[14] Table XVIII, p. 214, Plastic Working of Metals, Crane.

Pure elements, such as iron, copper, carbon and oxygen.

Uniform compounds made up of atoms of two or more elements fixed in definite ratio, such as iron carbide (Fe_3C), water (H_2SO_4).

Variable compounds, such as the phenolics, celluose acetates and other synthetic resins, in which properties may be varied appreciably by developing in varied proportion two or more closely related complex molecules made up in similar ways from the same elements like cellulose triacetate $C_6H_7O_2$ $(COO\ CH_3)_3$ and cellulose tetra-acetate C_6H_6O $(COO\ CH_3)_4$.

Solutions of elements, such as the brasses, in which various proportions of zinc atoms disperse among copper atoms.

Solutions of compounds, such as salt (Na Cl) dispersed in water (H_2O); water in cellulose acetate; or phenolics in alcohol.

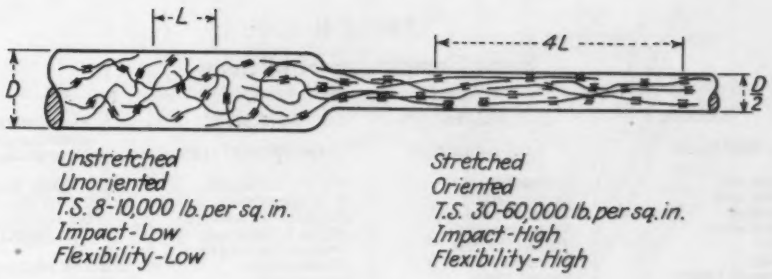
Mixtures or alloys or trade name recipes, which combine elements, compounds and/or solutions, often limited in proportion by mechanical, rather than chemical considerations.

Mixtures

From familiar clam chowder to alloy iron castings, useful mixtures take on characteristics of their components and even assume characteristics desirable beyond any of their components. Modern engineering materials have assumed variety often more intricate than clam chowder.

Cast iron is a mixture typical of the varied possibilities which the name implies. Many recipes are cooked up, containing various proportions of ferrite, atoms of pure ductile iron, Fe; molecules of iron carbide, Fe_3C, a hard, brittle compound known also as cementite; pearlite which is a solid solution of iron carbide in iron; free carbon or graphite; plus pinches of sulphur, phosphorus, silicon and possibly chrome carbides and nickel. Like the so-called "organic plastics," the properties of this mix vary widely according to the requirements and the skill of the cook. Tensile strength ranges from 10,000 p.s.i. for a sash weight iron to 80,000 p.s.i. for a heat-treated crankshaft iron. Compressive strengths may run to double or more which is quite characteristic of mixtures, whether they are organic, ceramic, metallic or what-not. Perhaps we may let it go for the moment that the color pigments, plasticizers, economy fillers, hardening and reinforcing agents which often go into mixtures, may cooperate successfully with binders or adhesive components in compression, but are unlikely to do so efficiently in tension.

Organic, *ceramic* and *metallic* groupings of engineering materials are not the arbitrary divisions they seem to be at first. The same common elements bob up here and there all through them. Carbon which may be soft as smoke or hard as a diamond, forms nearly 90 per cent of the molecular weight of rubber, C_5H_8. It becomes transparent as a large component of Lucite, Lumarith, Cellophane and other materials which stem from wood, cotton and coal. Among the hard cutting tool and die materials, carbon appears frequently both as carbides among the hard fillers and in the soft to brittle binders or adhesives. Aluminum, a metallic element, is compounded naturally in clay and rubies. It appears alone or with oxygen or other flavorings, as planes, pots, dishes, tiles, glass and carborundum all of which have in common that they may be mass produced for



ABOVE

FIG. 11—Diagrammatic representation of orientation by mechanical working of molecule chains of polymerized vinylidene chloride. Courtesy W. C. Goggin and R. D. Lowry, Dow Chemical Co.

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RIGHT

FIG. 12—The stress strain relation, accompanying Fig. 11 for Saran (vinylidene chloride) monofilaments, probably represents chain alinement during the horizontal portion and strain hardening as in the metals, during the subsequent rise. Courtesy W. C. Goggin and R. D. Lowry, Dow Chemical Co.

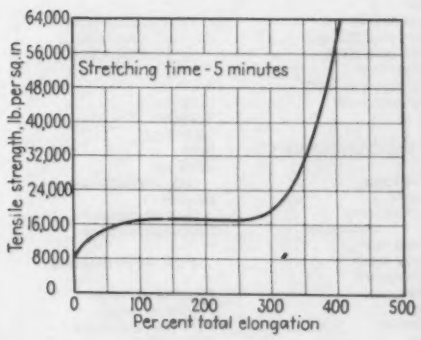

FIG. 13—X-ray diffraction photos of (A) amorphous Saran, (B) crystalline Saran and (C) oriented crystalline Saran. Courtesy W. C. Goggin and R. D. Lowry, Dow Chemical Co.

TABLE II

Some Components of Mixtures

FILLERS FOR BULK

Wood pulp
Wood flour
Asbestos
Marble flour
Sand
Gravel
Macerated cloth
Mica
Jute
Kapok
Hemp (sisal)
Flax
Ground cork
Powdered rubber
Lead (powdered)
Cotton flock
Walnut shell flour
Soy bean meal

FOR REINFORCEMENT

Wood plys
Papers
Fabrics (strip, macerated)
Metal rods
Metal mesh
Glass fabric
Straw, etc.
Rayon
Asbestos
Felt

FILLERS FOR HARDNESS

Iron carbide
Chrome carbide
Tungsten carbide
Tantalum carbide
Titanium carbide
Iron nitride
Chrome nitride
Vanadium nitride
Carborundum
Alundum
Crystolon

FOR HEAT, WATER OR CHEMICAL RESISTANCE

Asbestos
Graphite
Tungten
Slate flour
Mica
Whiting (calcium carbonate)
Barytes (barium sulphate)
Diatomacions silica

FOR APPEARANCE

Metallic pigments
Powdered copper
Powdered aluminum
Zinc oxide
Calcium sulphide (fluorescent)
Lithopone
Organic pigments

ADHESIVES THERMOSETTING

Phenol-formaldehyde
Urea-formaldehyde
Melamine-formaldehyde
Aniline-formaldehyde
Casein-formaldehyde
Phenol-furfural
Phenol-lignin
Columbia resin 39
Rubber-sulphur
Shellac
Copper-tin (in powder)
Copper-iron (metals)

THERMOPLASTIC

Phenol-acetone
Cellulose acetate
Cellulose nitrate
Ethyl cellulose
Cellulose acetate butyrate
Methyl-methacrylate
Acrylic
Vinyl acetate
Vinylidene chloride
Styrene (Vinyl chloride, Vinyl acetate)
Asphaltum
Gilsonite
Cobalt (as binders)
Iron (for)
Copper (carbides, etc.)
Glue (hide)

SOLUSETTING

Plaster
Cement
Paint oils (for pigments)

SOLUPLASTIC

Most thermoplastic and thermosetting resins (especially prior to setting) are soluble in various chemicals.

Casein
Magnesium sulphite
Calcium sulphite

PLASTICIZERS (intermolecular or intergranular)

FOR FLOW LUBRICATION IN MOLDING FOR FLEXIBILITY IN SHEETS

Water (in most paper)
Glycerol
Castor oil
Tung oil
Waxes
Opalwax No. 10
Dibutyl phthalate
Diethyl phthalate
Dioctyl phthalate
Tricresyl phosphate
Monophenyl phosphate
Chlorinated diphenyl
Fractol A
Flexol 3GH
Theop
Santicizer M-17
Diethylene glycol dipropionate (KP-45)
Diethylene phthalate
Dimethyl phthalate
Tripropionate
Triacetin
Triethyl citrate
Dibutyl tartrate
Talc
Sterate of zinc
Graphite
Sericite

the mass welfare with machine push and heat.

The chemistry of all these things can become quite complicated, but as their chemistry is usually not essential to the actual working of the expanding realm of engineering materials, the effort has been to give only enough of the basic chemical data for an appreciation of the groupings. The suppliers of the pig, sheet and powdered materials can furnish up-to-date physical data, etc., on their various compounds and alloys.

Table II lists a few of the alloying ingredients of commercially useful engineering materials. Instead of the elements and simple compounds which are combined to make up most metallic alloys and mixtures, we may start with complex materials for which it is not yet feasible to write a chemical formula. The arbitrary division of fillers, adhesive agents and lubricants and their subdivisions may be indefinite and overlapping in spots and the same elements may recur here and there in different combinations. Chemical research has shown thousands of possible combinations and commercial practice has found hundreds of these to be competitively useful. Changing relative material costs, heating costs and handling costs in conversion to satisfactory shapes determine selections which are, there-

TABLE III

Synthetic Thermoplastics

	Yield Point at 77°F. Approx. Lb/Sq. In.	Hot Shearing Temp. Approx. Deg. F.	Knife Edge Cutting Load 77°F. Lbs. Lineal Inch	Shearing Strength 77°F. Lb/Sq. In.	Compression Molding Pressure, Lb/Sq. In.	Injection Molding Pressure, Lb/Sq. In.	Compressive Strength Lb/Sq. In.	Tensile Strength Lb/Sq. In.	Elongation in 2 In., Per Cent	Powder to Solid Compression, Ratio	Modulus of Elasticity Lb/Sq. In.	Lowest Recrystall'n Temp. Approx. Deg. F.	Forming Compression Molding Temp. Approx. Deg. F.	Injection Molding Temp. Approx. Deg. F.	Thermal Coeff. of Expansion In./In. per Deg. F.	Weight Lb./Cu. In.
Cellulose-Acetate	5,000	77+	400 500	6,000 10,000	500 5,000	3,000 30,000	5,000 27,000	2,200 14,600	7.3 to 43	2-2.6	300,000	30 to 40	250 350	300 420	.000044 .000088	.045 .050
Cellulose Nitrate (Celluloid)		120 150	300 400		2,000 5,000		20,000 30,000	5,000 12,000	10 to 50		200,000 400,000		185 250		.000066 .000088	.049 .050
Cellulose Acetate Butyrate				6,000	500 5,000	8,000 30,000	7,500 30,400	2,500 7,500	5 90	2.-2.8	200,000 350,000		260 370	340 420		
Ethyl Cellulose	1,500 3,500			7,500	1,500 5,000	3,000 30,000	10,000 12,000	2,000 9,000	10 to 40	2.2-2.5	100,000 500,000		300 360	350 425	.000055 .000077	.041
Methyl Methacrylate	7,000 9,000	200		11,500	2,000 7,500	10,000 35,000	10,000 12,500	6,000 9,000	1 to 5	1.7-2.2	300,000 500,000	100 to 110	280 350	325 475	.000036 .000052	.0417 .0435
Vinyl Chloride								1,000 10,000			350,000 400,000				.000038	.0486
Vinylidene Chloride	26,000			8,000 10,500	250 5,000	10,000 30,000	7,500 8,500	4,000 8,000	15 to 25		70,000 200,000	30 to 40	250 350	300 400	.000087	.0595 .0633
Polystyrene (Vinyl Benzene)				8,000	1,000 5,000	10,000 30,000	11,500 15,000	5,000 9,000	2 to 5	2-2.3	170,000 470,000	-76	275 350	300 500	.000033 .000044	.038 .0385
SOLUPLASTICS																
Vulcanized Fiber		180	400	4,000			20,000 32,000	5,000 12,000								.036 .054
Aircraft Spruce (Douglas Fir)							5,000	10,000			1,300,000					.017

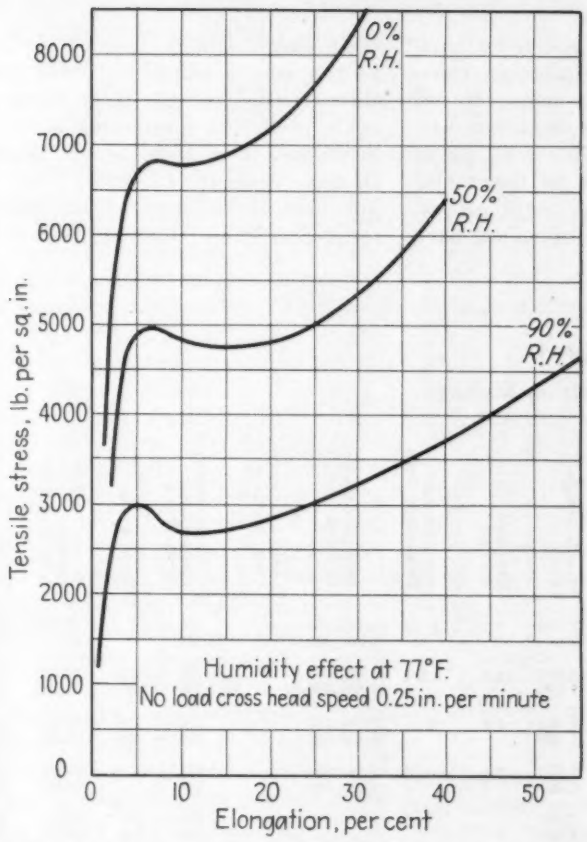
0% R.H.
50% R.H.
90% R.H.
Tensile stress, lb. per sq. in.
Elongation, per cent
Humidity effect at 77°F.
No load cross head speed 0.25 in. per minute

FIG. 14—As the proportion of water molecules dispersed among cellulose acetate molecules increases toward saturation, the plasticizing effect reduces the resistance to plastic flow and increases the plastic range. Courtesy Celanese Celluloid Corp.

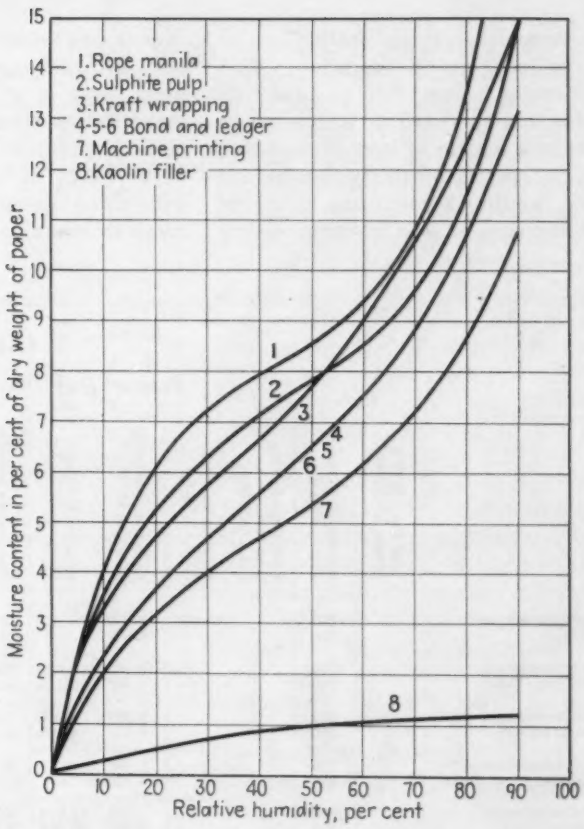
1. Rope manila
2. Sulphite pulp
3. Kraft wrapping
4-5-6 Bond and ledger
7. Machine printing
8. Kaolin filler
Moisture content in per cent of dry weight of paper
Relative humidity, per cent

FIG. 16—Variation of moisture content by weight in several different papers as relative humidity varies from dry to nearly saturated. Courtesy the Foxboro Co.

fore, also subject to frequent change. A few more typical mixtures may be of interest before going into grouping the methods of conversion.

Cements

The general term, cement, has come to cover a variety of adhesives familiar to the layman by function. Their natural ancestry goes back to the clay bearing muds and natural plasters which were reinforced with twigs or straw for pagan mansions. Ordinary white plaster on our walls is an interesting and chemically simple solusetting compound:

$$Ca\ O + H_2O = Ca\ (OH)_2$$

Lime + water = calcium hydroxide, which is not yet plaster but is the workable or moldable state in which it is troweled upon the walls. There it "sets" by reason of a chemical change which requires taking in carbon dioxide, CO_2, from the surrounding air and dissipating moisture, H_2O, to the air, thus:

$$Ca\ (OH)_2 + CO_2 = Ca\ CO_3 + H_2O$$

Calcium hydroxide + carbon dioxide = plaster + moisture. The builder's bonfire is needed both to bolster the supply of CO_2 and to help dry out the moisture. Natural plaster is the chalk of the white cliffs of Dover. When lime is mixed with asbestos, which is aluminum magnesium silicate, water is added to make plaster the adhesive in a furnace insulating material.

Concrete is a typical useful *soluset-ting mixture.* Substantial proportions of sand and stones serve as fillers which are cheap and strong in compression. Steel bars are added as reinforcement in suitable positions where tensile strength must be considerable. The adhesive cement is cooked up from suitable natural rock deposits and is in itself a mixture of several elements which set in a reaction typified by that of plaster, but complicated by variety so that it is doubtful if the chemists can write down just what does happen. Powdered iron, copper and aluminum are used in concrete for various special purposes. Aluminum powder with slightly alkaline water is said to generate hydrogen and form a light insulating sponge-concrete. The cheaper color pigments such as carbon black and metal oxide earths may also be included.

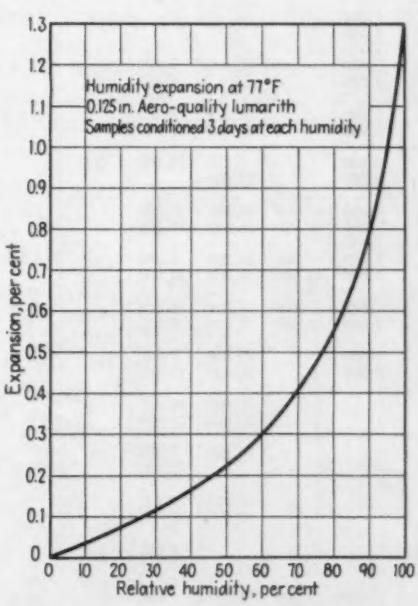
Humidity expansion at 77°F
0.125 in. Aero-quality lumarith
Samples conditioned 3 days at each humidity
Expansion, per cent
Relative humidity, per cent

FIG. 15—Change in dimension between dry and water immersed Lumarith indicates the small amount by volume of water which goes into solution at saturation. Courtesy Celanese Celluloid Corp.

Some mixtures have fillers which are characterized by hardness for cutting qualities or for exceptionally heavy compressive loads. Thus, for abrasive cutting, hard crystalline particles of carborundum (aluminum oxide in iron oxide) or Crystolon (silicon carbide) are commercially bound together with such varied adhesive agents as rubber, phenolic re-

sins, ceramic clays or shellac, which is a resinous insect secretion. Tool steels might be described as hard iron carbide, chrome carbide and possibly others in a matrix of iron as the adhesive. A species of thermosetting reaction, familiar as nitriding, produces hard surfaces of iron nitride, chrome nitride and vanadium nitride by "mixing" nitrogen gas and chrome vanadium steel at suitable temperatures. Hard tungsten carbide, tantalum carbide or titanium carbide with up to 20 per cent of cobalt as the binder will stand exceptional cutting pressures or compressive loads, but have their shortcomings in tension. Cold forging and heading dies made from them require shrunk steel bands or other preloaded reinforcing members to protect them from tensile failure. In many cases the foregoing mixtures are pressed to shape from powder form and then sintered (baked at

TABLE IV

Property of Thermosetting Mixtures

	Yield Point at 77°F. Approx. Lb/Sq. In.	Hot Shearing Temp. Approx. Deg. F.	Knife Edge Cutting Load 77°F. Lbs. Lineal Inch	Shearing Strength 77°F. Lb/Sq. In.	Compression Molding Pressure, Lb/Sq. In.	Injection Molding Pressure, Lb/Sq. In.	Compressive Strength Lb/Sq. In.	Tensile Strength Lb/Sq. In.	Elongation in 2 In., Per Cent	Powder to Solid Compression, Ratio	Modulus of Elasticity Lb/Sq. In.	Lowest Recrystall'n Temp. Approx. Deg. F.	Forming Compression Molding Temp. Approx. Deg. F.	Injection Molding Temp. Approx. Deg. F.	Thermal Coeff. of Expansion In./In. Deg. F.	Weight Lb./Cu. In.
Phenol-Formaldehyde (No Filler)		200 250		10,000	2,000 5,000		10,000 30,000	7,000 12,000	1.1	2.–2.6	700,000 1,000,000		300 340		.000013 .00003	.046
Phenol-Formaldehyde (Wood Flour Filler)		200 250			2,000 4,500	2,000 10,000	16,000 36,000	6,000 11,000	0.6	2.2–3.	1,000,000 1,500,000		280 360	275 375	.000020 .000041	.0481 .055
Phenol-Formaldehyde (Mineral Filler)		200 250			2,000 6,000	2,000 15,000	18,000 36,000	4,000 8,000	0.6	2.–8.	1,000,000 4,500,000		270 350	275 350	.000014 .00002	.061 .075
Phenol-Formaldehyde (Macerated Fabric Filler)		200 250			2,000 8,000		20,000 32,000	5,500 8,000	0.7	2.5–15.	700,000 1,200,000		270 350		.00001 .00003	.049 .053
Phenol-Formaldehyde (Sisal Felt Filler)		200 250			300 3,000	10,000 20,000	10,000 35,000	7,000 12,000		2.–5.			275 350	275 350	.0001 .00003	.025 .050
Phenol-Formaldehyde (Paper Laminate)	4,000 18,000	200 250		12,500	1,000 3,000		20,000 40,000	7,000 18,000	1.5	1.5–3.	400,000 3,000,000		275 350		.000009 .000013	.047 .049
Phenol-Formaldehyde (Cotton Fabric Laminate)	3,000 8,000	200 250		15,000	1,000 3,000		30,000 44,000	8,000 12,000	1–2	1.5–3.	350,000 1,500,000		275 350		.000009 .00001	.047 .049
Phenol-Formaldehyde (Glass Fabric Laminate)	4,500 28,000	200 250			1,000 3,000		42,000 47,000	14,000 20,000	2		1,000,000 2,000,000		275 350			.050 .057
Phenol-Formaldehyde (Asbestos Cloth Laminate)		200 250			1,000 3,000		18,000 45,000	7,000 12,000		1.6	350,000 1,500,000		300 350		.000009 .000013	.056 .066
Birch Plywood (Phenolic Binder)					200 2,000		5,700	13,100			1,400,000					.0288
Urea-Formaldehyde (Alpha-Cellulose Filler)				13,000	1,500 6,000		20,000 24,000	5,500 7,000		2.5–3.	1,200,000 1,500,000		290 325		.0000138 .000016	.052 .054
Urea-Formaldehyde (Cotton Fabric Laminate)	600 2,500				1,500 6,000		7,000 8,700	5,100 6,900	8–22		560,000		290 325			.044
Melamine-Formaldehyde (Alpha Cellulose Filler)					1,500 6,000					2.0–2.3			280 340			.0537
Melamine-Formaldehyde (Asbestos Filler)					1,000 4,000		30,000	5,500 7,000	.30–.45	2.1–2.5	1,600,000		280 330		.00001 .000025	.0612 .067
Aniline-Formaldehyde (No Filler)					1,500 6,000		20,000 23,000	8,500 10,000		2.5–3.	500,000 600,000		300 340		.00002 .00003	.044 .045
Casein-Formaldehyde					2,000 2,500		5,300 27,000	10,000	2.5		510,000 570,000		200 225		.00004	.0487
Phenol-Furfural (Wood Floor Filler)					1,000 4,000	300 10,000	28,000 36,000	6,000 11,000		2.5–3.	1,000,000 2,500,000		330 400	250 375	.00001	.047 .050
Phenol-Furfural (Mineral Filler)					1,000 4,000	300 15,000	24,000 36,000	5,000 10,000		2.5–6.	1,000,000 4,500,000		330 360	250 375	.00001	.057 .072
Phenol-Furfural (Fabric Filler)					1,000 8,000	300 30,000	26,000 30,000	6,500 8,000		4.–15.	700,000 1,200,000		300 360	250 375	.000025	.047 .050
Phenol-Lignin (Laminate)					1,500 2,000		25,000 30,000	7,500 12,000		2.–3.	800,000 2,000,000		365		.000011 .000013	.049 .051
Columbia Allyl Resin 39 (Paper Laminate)							15,000 31,000	10,000 21,000								.049
Columbia Allyl Resin 39 (Fabric Laminate)							29,000	1,000 7,500	4.		550,000		160 240		.000013 .000023	.043
Columbia Allyl Resin 39 (Glass Cloth Laminate)	12,700						52,000 60,000	30,400 39,000			1,700,000		160 240		.00001	.062
Columbia Allyl Resin 39 (Sheet)								6,000			350,000	140	160 240		.000049	.047
Shellac					1,000 2,500	1,000 1,200	10,000 17,000	900 2,000		2.–3.	500,000 600,000		240	180 260		.039 .098
Rubber-Sulphur								1,000 4,000	600		400					.035 .045
Ceramic "Prestite" (Flint, Feldspar, Ball Clay China Clay)							48,000	5,000			10,000,000	1200			.000002 .000006	.088

suitable heats) to plasticize or set the binder.

Paper as a Plastic

Papers are mixtures with widely contrasting properties to those just mentioned. They are of interest because pressure and dies are used more and more to cut and form them into useful shapes. In many applications, papers of varying quality and possibly cross creped or gathered to improve their forming range, serve as the reinforcing medium, with or without other fillers in many "laminated" sheets and shapes with phenolic, urea or melamine thermosetting resins as binders or glues. Paper is likely to be a mixture of organic and inorganic, vegetable, mineral and synthetic constituents. As a rule it starts with a suitable wood pulp broken down into clean cellulose fibers and mixed with water soluble adhesive agents which may also serve as a size to offset absorbent tendencies. Then it is further mixed, impregnated or coated with thermosetting or thermoplastic adhesives, coloring matter, surface coatings and plasticizing or waterproofing waxes.

The added materials may include starch, casein, various clays, bleaching powder, barium sulphate (to fix whiteness), asphaltum, alum, animal glues, natural rosin and various synthetic plastics. Thus, the elements in paper may be C, H, O, Ca, B, Cl, Ba, Al, etc., indicating the possible complexity of reactions. Depending upon the choice of constituents in the mixture, paper may combine properties so that it is both soluplastic and thermosetting. This combination permits softening the soluble binder in the paper or layers of paper with a proper proportion of moisture to permit stretching or forming to the desired shape, then curing at sufficient temperature to dry and to set the resinous binder, and under sufficient pressure, to assure intimate contact of layers.

Plasticizers

Plasticizers in mixtures, such as those listed in Table II, might be described as integral or internal lubricants. *In powder mixtures*, they give greater mobility and easier flow through passageways and molds. For use with ethyl cellulose, for example, one authority recommends that a plasticizer be added in the proportion of 10 to 20 per cent for compression molding, 15 to 30 per cent for injection molding and 25 to 50 per cent for extrusion mixtures. *In sheet materials*, about 5 per cent by weight of water in paper keeps water-soluble binders soft enough to avoid brittleness. Cellophane, a cellulose sheet, which would tend to brittleness if dried, is dipped in glycerol, absorbing up to 7 per cent of it for flexibility and holding the cellulose in a solution relation of spaced molecules. Water also goes "into solution" in some of the thermoplastics improving their plasticity as indicated by elongation and, reducing their resistance and elastic limit at the given temperature as shown in Fig. 14. In Fig. 15 is shown expansion of cellulose acetate as water goes into solution in it from minimum to maximum content. Even at 100 per cent R. H. (relative humidity) the total amount of water which will dissolve or disperse in cellulose acetate is small but in view of the great difference in molecular weights, the ratio in molecules of each at saturation is not so low. That is, there may be one molecule of water spaced among four or five molecules of cellulose acetate. The effects of this inclusion or solution of a fluid compound in or dispersed through the structure of a less mobile material may help in visualizing the function of the plasticizer.

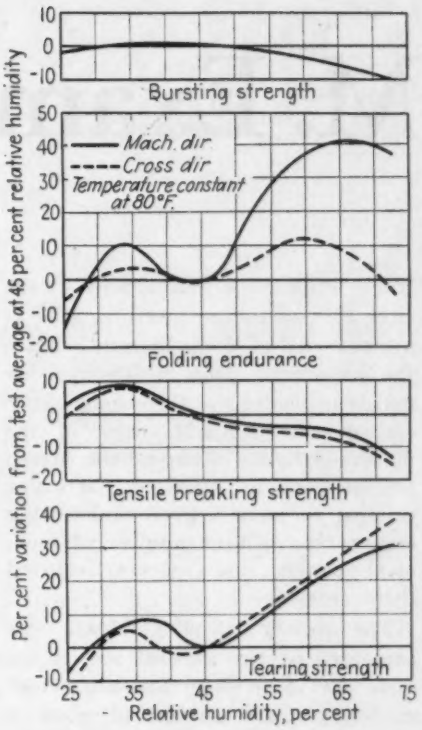

FIG. 17—The effect of the plasticizer upon the binder through a part of the relative humidity range is reflected in varying comparative properties of a paper. Courtesy the Foxboro Co.

While water is the vital plasticizer in most papers, Fig. 16 (and wood), it is erratic in its tendency to evaporate and dissipate or return as the relative humidity of the surrounding atmosphere decreases or increases. It is easy to make a paper brittle by over-drying, Fig. 17, but it is more difficult to restore pliancy throughout the paper. Perhaps this is because to get H_2O molecules into the inner structure it would be necessary to use so much moisture on the surface as to dissolve out fillers and binders among the surface fiber chains. Absorption and dissipation of atmospheric moisture by many mixtures has a sometimes troublesome tendency to carry off small amounts of soluble plasticizers and binders.

Among synthetic wood "plastics" water is generally an incidental and uninvited plasticizer, and in a few cases is not taken up at all. Alternatives include certain oils, talcs, waxes and their chemical equivalents as suggested in Table II. The ideally stable plasticizer, Fig. 18, would be unaffected by atmospheric or molding temperatures or by oxidization, or otherwise

(CONCLUDED ON PAGE 144)

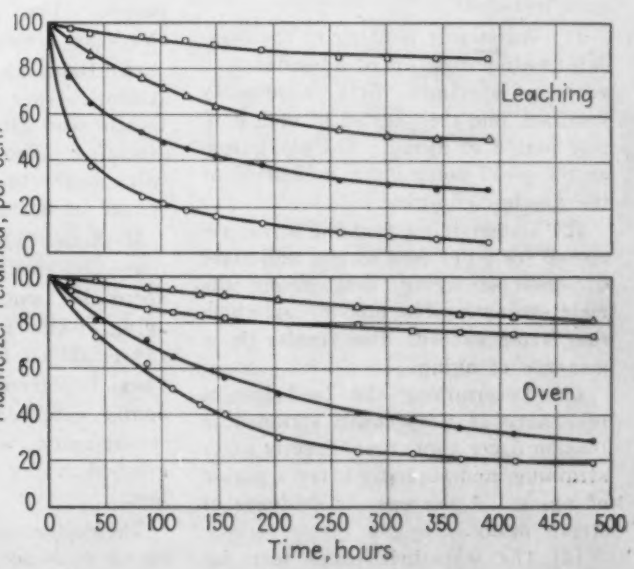

FIG. 18—Loss or dissipation of several plasticizers out of combination with compression molded plastics. Upper curves show percentage loss by leaching or dissolving into surrounding water at 104 deg. F. Lower curves show loss by evaporation into air accelerated at 149 deg. F. Plasticizers tested: Open circles, dibutoxyethyl succinate in vinyl chloride acetate copolymer (87%); filled circles, same in polyvinyl butyral; triangles, dibutoxethyl fumarate in polyvinyl butyral; squares, glycidyl esters of babassu oil in polyvinyl butyral. Courtesy Western Regional Research Laboratory, U. S. Dept. of Agriculture.

. . . A.S.T.M. Examines War T

WITH a registered attendance of 1452 members, committee members, and guests attending the meetings, and 245 technical committee meetings at each of which there was excellent attendance of members, and an interesting technical program of papers and reports in the fields of both metals and non-metals, the forty-sixth annual meeting of the American Society for Testing Materials held in Pittsburgh, June 28 through July 1 was outstanding. The attendance was the third highest ever recorded at a meeting, exceeded only by the 1937 meeting in New York, and the 1941 meeting in Chicago (registered attendance, 1553).

Many important actions on standards and discussion on results of numerous research investigations featured both the formal technical sessions and the committee meetings. At no previous annual meeting has there been greater interest in technical work; attendance and actions at the over 200 committee meetings was at a peak. All of these factors indicate the importance with which industry and branches of the Government concerned view A.S.T.M. work in the materials fields. Four of the fifteen formal sessions were of particular concern to metallurgical and testing engineers. A large number of technical papers and reports featured these sessions.

The society's Dudley Medal was presented at the general session on June 30 to Walter Bonsack, chief metallurgist and director of research laboratories, National Smelting Co., for his paper, "Discussion of the Effect of Minor Alloying Elements on Aluminum Casting Alloys," published August, 1942, in the A.S.T.M. bulletin. It was the first paper not presented at an annual meeting of the society to win the award.

Thwarting Age Straining with Titanium

"THE Strain Aging of Killed Low-Carbon Steel, with Particular Reference to the Effect of Titanium," presented by George F. Comstock, Titanium Alloy Mfg. Co., summarized investigations by six different methods, pointing out that one reason for disagreement as to the cause of strain aging is the use of different methods of testing. The methods used included:

(1) Automatic plotting of the load-deformation diagram of a tension test, with a specimen first adequately strained, and then tested after a definite period of aging. The elongation at the yield point is an indication of the amount of aging.

(2) Determining first the stress required for 5 per cent strain, and after a period of aging, determining the yield strength. The amount by which the latter exceeds the former is a measure of aging.

(3) Determining the Izod impact resistance of a specimen strained in tension 5 per cent, first directly after straining, and secondly after a period of aging. A decrease is evidence of strain aging.

(4) The work-brittleness test, involving Izod impact tests of specimens strained by cold drawing through a die. Using a tapered specimen, the amount of strain is varied, and the aging factor may be introduced between straining and impact testing.

(5) Measuring the Rockwell hardness of Brinell impressions, some immediately, and some after an aging period. The increase in hardness should be a measure of aging.

(6) Damping records of specimens strained 4 per cent in tension, made 15 min. and 7 days, respectively, after straining. The decrease in the latter value below the former indicated the degree of aging.

Methods (1), (2) and (6) were found generally to classify steels in about the same way regarding strain aging, while methods (3), (4) and (5) classified them quite differently. These two groups of test methods evidently determine different kinds of strain aging, which should be distinguished in any discussion of the subject.

The chief cause of the kind of strain aging indicated by the return of a well-market yield point on aging after straining, as well as of the yield point itself, is probably carbon dissolved in the ferrite. Elimination of dissolved oxygen alone apparently has very little effect on that kind of strain aging, although oxygen probably is the cause of the kind shown by decrease in impact values.

These tests, made on low carbon killed steel on a small laboratory scale, and forged into bars, also indicate that strain aging shown by the return of a definite yield point in a specimen strained in tension is entirely different from strain aging shown by loss of notched-bar impact value in strained specimens held for appreciable periods of time. Steels classed as "aging" by the yield point method, were usually classed as "non-aging" by the impact method. Steels classed as non-aging by the yield point method may show comparatively low impact values.

Whether a given steel shows "strain aging," especially by the impact test method, depends often on the amount of strain, and 2 per cent strain either in tension or by cold drawing is generally insufficient.

Damping capacity tests may be used to indicate susceptibility to the same kind of strain aging as is shown by the yield point method. The Sauveur hardness test method is less reliable and gives results more in agreement with the impact test method.

Strong deoxidation as with aluminum may decrease the amount of strain aging, of the kind shown by the yield point method, in annealed steels with over 0.08 per cent carbon aged at room temperature, but otherwise it is ineffective for preventing that kind of strain aging. It does, however, decrease effectively the kind of strain aging shown by impact tests, which is, therefore, probably due to oxygen in the steel.

The nitrogen content of killed low-carbon steels, up to 0.015 per cent soluble of 0.02 per cent total, does not affect to an important degree the susceptibility to either kind of strain aging.

Steels containing as much as 0.10 to 0.12 per cent carbon, with less than

Time Material Problems . . .

4.5 times as much titanium, show aging by the yield point method when aged at 450 deg. F., but may not show as definite aging by this method in three weeks at room temperature, or may age more slowly at room temperature than similar lower-carbon steels. All steels of this nature were non-aging by the impact test method.

Low-carbon steels containing at least 4.5 times as much titanium as carbon do not show a definite yield point after straining and aging, whether aged three weeks at room temperature, 16 hr. at 390 deg. F., or 1 hr. at 450 deg. F. Low-carbon steels with less titanium, even though deoxidized with aluminum, show strain aging by that method under the same conditions.

The high-titanium non-aging low-carbon steels were coarser grained than the others, but some of them had just as good notched-bar impact resistance as the finer-grained lower-titanium steels. Some of them, however, were low in impact resistance and the reason for the difference was not discovered.

Increase of yield strength on aging after 5 per cent strain is negligible in low-carbon steel containing at least 4.5 times as much titanium as carbon, which has no well-defined yield point.

In steels containing up to 0.135 per cent carbon, the presence of titanium to the extent of at least 4.5 times the carbon content greatly lowers the yield strength of the normalized steel, decreases the tensile strength to a smaller degree, increases the ductility, and causes the steel not to show a well-marked yield point. The effects mentioned do not occur gradually with increasing titanium content, but smaller amounts of titanium below the critical amount may even give a gradually increasing yield strength with titanium, up to about 4.5 times the carbon content, when the changes in properties noted in conclusions 7, 9, and 10 occur. Thus, it is only the elimination of the last traces of carbon uncombined with titanium that is effective in producing those changes.

When such titanium steels are heated for a long time at high temperature, as in a soaking pit, and tested without subsequent heat treatment at lower temperatures, the yield and tensile strengths are higher and the ductility lower than when ingots are not so treated, or than after normalizing.

This low-carbon titanium steel, with titanium-carbon ratio of at least 4.5, should be a desirable material for deep-stamping sheets since it requires only normalizing, and not annealing, to develop high ductility with low yield strength and fair tensile strength, has no definite yield point so that "stretcher strains" could not occur, and its yield strength does not increase on aging after straining.

. . . Among the subjects discussed at the society's second World War II convention were plated lead coatings on steel, chromium plating of tools and gages, tests for drawability and hardness, and strain aging of killed low carbon steel.

Feasibility of Lead Coating Steel

"PROPERTIES of Plated Lead Coatings on Steel," by Gustaf Soderberg, Udylite Corp., was prepared to assist users of the new A.S.T.M. emergency specifications for electrodeposited coatings of lead on steel in choosing the proper type of coating for each application.

Since exposure test data for lead coatings are somewhat meager, the author included some test results on the corrosion of solid lead and on the corrosion of steel and other metals in contact with lead. Such information indicates that lead coatings have greater tendency to protect the underlying iron electrochemically through pores in the coating in uncontaminated or seacoast atmospheres than in an industrial atmosphere. The presence of chlorides in industrial atmospheres seems to increase the protective ability of the lead. In a strictly industrial atmosphere lead does not offer much, if any, electrochemical protection and may actually cause acceleration of the corrosion of the steel. The porosity of the coating depends on the base metal and the structure of the lead deposit. Light burnishing and even scratch brushing assist in making thin lead coatings less porous.

Under no circumstances should lead-plated steel come in contact with aluminum. Generally speaking, it should also be kept away from contacts with zinc and zinc-plated parts, although one may expect that a small lead-plated part would not do very great damage to a large zinc-plated part.

Lead-plated steel ordinarily would not cause acceleration of the corrosion of copper, iron, nickel, or tin.

For such uses as storage battery fittings, boosters, adapters, linings of gas shells, gas heater flues, brine tanks for refrigeration, and linings for chemical apparatus, thicknesses of 0.003 to 0.005 in. of lead are suggested as being substantially non-porous. Lead plated nuts and bolts usually have a thickness of 0.0005 to 0.001 in. and most ferrous metals are plated with a thickness of 0.0005 to 0.008 in. depending on the subsequent exposure of the plate.

Electrolytic lead coatings appear to have been used to a considerably larger extent in Continental Europe. The Schlotter process which makes use of a lead phenosulfonate bath is being employed in Germany on a variety of parts, with steel sheet, lead-plated to a thickness of 0.00052 in., advocated for roofing sheet, storage tanks for gasoline and oil, automotive gasoline tanks, and ice containers. According to American experience, somewhat heavier coatings, a minimum thickness of 0.00075 in., are required on the bottom of automotive

gasoline tanks for most satisfactory results.

Lead coatings are used widely in Germany on steel parts such as structural members used in the building of railroad stations, tunnels, and bridges, and on railroad screws, bolts and nails. The German State Railways specify exceedingly thick coatings on structural parts which have to stand up in this very severe service: 0.012 in. providing an expected life of 10 to 20 years against 3 to 5 years for the best paint coatings.

In Switzerland the thicknesses of lead coatings used on supports for electric lines, channel irons for cables, earthpoles for grounding high tension lines at power stations; structural parts for factories, foundries, railroad stations, etc., and chemical plants varies, depending on the condition of exposure, from 0.008 to 0.12 in. The latter figure probably refers to strictly chemical uses. Nuts and bolts usually have a thickness of 0.005 to 0.001 in.

Chromium Plating Tools and Gages

"CHROMIUM Plate in Engineering Applications—Its Thickness and Finishing," presented by T. G. Coyle, United Chromium, Inc., was another of the interesting papers presented at the session on corrosion and electrodeposited coatings. The author pointed out that hard and fast recommendations on plate thickness can hardly be made for a single type application, let alone a specification to cover the many and diverse applications of chromium plate in its engineering uses. It is possible, however, to give information of a general nature for the various uses, to serve as a guide to final determination, by trial, of the best practice for individual cases.

Plug gages, ring gages, and other gages of various types are generally finished with a chromium plate 0.001 to 0.0015 in. thick. Beyond giving a deposit of sufficient thickness to withstand the load and pressure of the gaging operation, the object is to have a deposit of thickness greater than the wear tolerance of the gage. In this way a chromium surface is maintained throughout the accuracy life of the gage, and at the same time the underlying steel basis metal is protected from wear or scoring or other damage so that the gage can be resized very easily by dissolving ("stripping") the remaining chromium and replating the gage. This practice, it should be noted, applies to many of the other applications discussed below, in particular drawing dies and mandrels, many machine parts, and certain tools.

In some gaging operations, where tolerances are extremely small or the gage must have a sharp working edge, the chromium plate thickness should be limited to much less than the values given above. The thickness should be only of the order of 0.0001 to 0.0003 in. The purpose here is to avoid chipping or spalling of the plate that might occur on the sharp edge if heavier deposits were used. The thinner deposits, even though they may afford lesser increase in number of gaging operations than the heavier plate, still give the advantages of the chromium working surface, and are desired for this reason as well as for protection of the steel and the resizing practice the plating makes possible.

In practice, the usual procedure is to grind the gage undersize by the amount of plate thickness required, plate oversize by an amount sufficient to give grinding stock, and finally grind or lap back to gage size, leaving a finished chromium deposit of the required thickness. In cases where the thin (0.0001 to 0.0003 in.) deposits are used, the gage may be plated directly to size with sufficient accuracy, and in some cases also in the greater thickness; but generally it is more practical and economical to get the accurate sizing required by grinding or lapping to size after plating. On gages, a plate 0.002 to 0.004 in. oversize in diameter usually provides sufficient stock for grinding, allowing for eccentricity in successive grinding set-ups, but the amount actually required may be more or may be less depending on the size of the gage as well as other factors, such as grinding equipment and methods.

The finish on the gage should be smooth and lustrous. As a rule, the ground, lapped, or honed finish is adequate, but a light buffing operation for the final finish may be desirable.

A stress relief heat treatment after plating is advisable, especially for the gages with sharp corners and edges and gages having higher hardness values before plating.

As in the case of gages, many tube-drawing plugs and dies are ground undersize, plated oversize, and ground to size for use. However, unlike gages, dies often are used without grinding or finishing after plating, because the size tolerances are usually greater and the first few passes of the work over the die produces a satisfactory finish. Dies and plugs are given stress-relief heat-treatment after plating.

The best thickness of chromium for drawing plugs and dies depends on the material to be handled, the speed of drawing, and the reduction in each draw. A typical thickness of deposits is 0.003 in. In some cases of large dies or large tolerances thicknesses as great as 0.008 to 0.010 in. are applied, and in others deposits as thin as 0.0005 in. are used. These lower thicknesses are applicable to some of the smaller plugs and dies, and have been used to avoid the extra grinding operations often necessary with the heavier deposits.

As in tube drawing, the thickness of plate on forming dies depends largely on the material being worked, and the particular operation, but generally the plate thickness is less than that used for tube drawing. For simple forming operations, a thickness of 0.001 to 0.002 in. is generally satisfactory. For deep drawing and working thin-wall sections, thinner deposits are often better, down to 0.0002 to 0.001 in. The same applies to stamping, shearing, and blanking operations; similarly, coining dies should have the thinner deposits, 0.0002 to 0.0005 in. A generalization for these types of dies and tools is that for those operations involving sharp impact or cutting action, the thickness of deposit should be kept at a minimum consistent with getting economical and efficient performance from the plating operation. Wherever there are sharp edges or impact involved, the heavier deposits show greater tendency to spalling or chipping.

Except where highly abrasive materials are being molded, the plate thickness on molding dies need not be very great. For most plastics, thicknesses of 0.0002 to 0.0005 in. are generally satisfactory; for clays and similar materials, heavier deposits up to 0.002 in. thick are recommended; and on large work, still higher values.

A very important factor in good results from plated molds is the finish of the molding surface before and after plating. Except where dull or special finishes are required on the molded product, the mold should be finished to a high luster by lapping, polishing, or buffing.

In cutting operations, the thickness of deposits should be kept at a minimum consistent with getting most economical or efficient performance

from the plating operation. Cutting surfaces in general should have relatively thin deposits to minimize tendency to spalling or chipping; usually not more than a few ten-thousandths in. thickness, and in many instances less than 0.0001 in., as little as 0.00005 in.

With cutting tools especially, the best thickness of plate depends not only on the operating conditions, such as speed and amount of cut, but also very largely on the material being cut. The harder the metal being cut the thinner should be the chromium deposit. The thinner deposit sacrifices the longer wear a heavier plate might give, but in cutting on harder and tougher materials, the heavier deposits show a greater tendency to fail by chipping or spalling. A suggested range of plate thickness for cutting tools in general is 0.00005 to 0.0001 in. for hard steels, 0.0001 to 0.00025 in. for mild steels, cast iron and non-ferrous metals like aluminum, brass, bronze, copper, and zinc; and 0.00015 to 0.0005 in. for non-metallics such as rubber, slate, plastics, wood, and fiber.

Inasmuch as most cutting tools have thin cross-sections and are made of high speed or high-carbon steels, heat treatment for stress relief after plating is especially recommended.

Another precaution in handling cutting tools it to dress the cutting edge carefully before plating. It should be made free from any slight burring or feathering; this may be accomplished by a slight honing operation, by hand, using a fine stone.

A few of the more commonly plated cutting tools deserving special comment are described in the following:

Twist drills are chromium plated over their full length. The flutes should be completely covered with chromium. With the plate so thin (0.00005 to 0.0005 in. as discussed above) generally the drill needs no special sizing. Before being put into use the drill should be dressed to remove chromium from the point and to provide proper clearance on the back faces. The drill is sharpened as required, and one plating should last the life of the drill.

Reamers are usually plated all over and then ground to proper size and clearance. The grinding leaves chromium on only the face of each blade. The plate thickness on reamers may run a little heavier than on other cutting tools, from about 0.0001 to 0.0005 in.

Files are given thin deposits and plated only enough to give complete coverage. The current required depends to some extent on the condition of the file; a current density of 4 to 6 amp. per square in. of superficial area is recommended for about a 5 min. plating time at 100 to 120 F. Heavy deposits dull the file and should be avoided. The files are ready for use as plated except for the stress relief heat treatment that should follow the plating.

Broaches, milling cutters, gear cutters, knives, threading dies, taps, and *thread chasers* are all examples of cutting tools commonly chromium plated. The general comments and suggestions at the beginning of this section apply to these tools.

• • • New officers of the A.S.T.M., named at the Pittsburgh meeting, are: President, Dean Harvey, materials engineer, Westinghouse Electric & Mfg. Co.; vice-president, J. R. Townsend, materials standards engineer, Bell Telephone Laboratories, Inc.; executive committee members, T. A. Boyd, Fuel department, Research Laboratories division, General Motors Corp.; W. H. Finkeldey, Singmaster & Breyer; E. W. McMullen, director of research, Eagle-Picher Lead Co.; E. O. Rhodes, technical director, Koppers Co., Tire and Chemical Division; and F. G. Tatnall, manager, Testing Equipment department, Baldwin-Southwark division, Baldwin Locomotive Works. Mr. Boyd heads the executive committee.
The retiring president is H. J. Ball, Lowell Textile Institute.

New Technique for Drawability Testing

"A TEST for measuring Drawability of Deep-Drawing Steels" was presented by Francis W. Boulger, and F. B. Dahle, Battelle Memorial Institute, who pointed out that no mechanical test in use at present gives an entirely adequate or reliable indication of the behavior to be expected from sheet metal used in industrial deep-drawing operations. The authors' testing method modified the ordinary cupping test to include bending and upsetting actions in the testing operation.. The adaptation resulted in setting up a single stage deep-drawing operation for studying sheet materials. By this method the materials are classified on the basis of their drawing performance under fixed conditions. In contrast to the wedge-draw test, it provides an actual rather than a simulated drawing operation. It gives a closer differentiation between materials, because each blank is made up of a multitude of tiny wedges, and the success or failure of the cup-drawing operation is the integrated result of their behavior.

The testing method consists of drawing flat, circular blanks into round-bottomed cylindrical shells by means of a simple die and plunger. The inside diameter of the cups formed is 1 in., and the heights vary with the size of the blanks tested. The index of the drawing quality of a material in this test is considered to be the maximum diameter of blank which can be formed and the percentage breakage in that size. Ten disks of the critical size are tested and the results are used as the basis of comparison. Data are also recorded for maximum diameter of blanks drawn with no breakage, and diameter of blanks which all fail.

The results obtained in this test are reported in terms of "cup-drawing indices." The cup-drawing index is made up of two parts. The first part of the value is a figure denoting the size of the critical diameter as the number of 1/32-in. increments over 2 in. The last part of the index indicates the percentage success in forming blanks of the critical size for the material. For example, a steel may be said to have a cupping index of 9–60 per cent. Its drawing quality as measured by this test may also be described at length as follows: 40 per cent of the 2 in. plus 9/32 in. blanks broke and 60 per cent formed cups successfully, all blanks of smaller diameter formed cups successfully and all blanks over 2 9/32 in. in diameter broke on testing.

The magnitude of the changes in the average cup-drawing values for the different carbon groups indicates that the carbon content is the controlling variable in samples rolled less than 0.5 per cent, and that the lower carbon group has the better average cupping index. For the samples rolled over 1 per cent, the cup-drawing indices were practically unaffected by the carbon contents of the groups. For the groups which received the intermediate amounts of temper rolling, the 0.08 and 0.09 percent carbon samples had identical average cup-drawing indices. This average index was considerably lower than the average for the 0.07 per cent carbon samples rolled similar amounts. These results indicate that temper rolling

impairs the drawing qualities of rimmed steels. In general, the deleterious effects of temper rolling are less noticeable with increasing carbon contents, and the 0.08 and 0.09 per cent carbon steels are similar in drawability when temper rolled 0.5 per cent or more. It also appears that for the samples tested, temper rolling in amounts of about 1 per cent or more masks differences initially attributable to variations in carbon content.

The results of tests on approximately 200 samples of commercial rimmed sheet steels indicate:

The results of the cup-drawing test have a high order of reproducibility.

The experimental test method rates materials in a different manner than the standard ductility, hardness, and tension tests.

The properties measured by the cup-drawing test are believed to be some of those which control the deep-drawing performance of drawability of materials. The few data available from commercial operations support this opinion.

The average effect of variations in composition on cup-drawing tests results, and presumably drawability, were determined for the samples tested. Increases in carbon and sulfur contents were found to lower cup-drawing indices. Variations in manganese, copper and phosphorus contents, for the ranges covered by the sample group, were found to be without effect on the test results.

The Elusive Measurement of Hardness

ATTRACTING considerable interest was the symposium on hardness testing in relation to design, led by Professor John M. Lessels, Massachusetts Institute of Technology, and participated in by S. R. Williams, Amherst College, S. L. Hoyt, Battelle Memorial Institute, and J. O. Almen, General Motors Research Laboratories.

In his introductory remarks, Professor Lessells pointed out that while the term hardness is not a fundamental physical property, such as melting point or modulus of elasticity, nevertheless the hardness number has an important engineering value both in control of material and in correlation with tensile strength.

Mr. Williams, discussing "Present Types of Hardness Tests" commented that hardness measuring methods have been developed before a real theory on hardness exists, thus reversing the customary precedure in making physical measurements. Although hardness cannot yet be defined by the physicist or the metallurgist, as regards its statement in terms of fundamental units as, for example, length, mass and time, it is a conservative statement to say that hardness tests are by far the most widely used of all physical tests on materials.

Possibly the point that confuses the issue more than any other, Mr. Hoyt said in his discussion on "Fundamentals of Hardness Testing," is the necessity of altering the metal during the tests and thus changing the very property whose measurement is sought. A pertinent question, he said, particularly with reference to copper, is: "Do we really need to know the true hardness unaffected by indentation hardening effects?" Possibly, he pointed out, that figure would be more useful in controlling annealing for high conductivity or of cold rolling for springiness, but though the scales would not be the same and the actual values would differ, it appears that the two scales would be about equally useful for control purposes.

With steel, the situation is about the same, since hardness readings are mostly used for check and control purposes, but in the special case of deep drawing applications the ordinary hardness readings are notoriously inadequate, possibly because of their inability to distinguish between initial hardness and work hardening effect.

The choice of the testing method depends on such factors as the hardness level, size of the part, condition of the surface, object of the determination, etc., and the theoretical features which exclude the test from being a true measure of hardness play no part in the application of the test in technical practice when properly done, he said, adding that it is sufficient to know that the metal when processed in a certain way either does or does not have the required hardness number. In technical practice there need be no pretense that steel and cold worked brass of the same hardness number are equivalent, or that a cold worked metal with twice the hardness number of the same metal annealed is therefore twice as hard.

A real need, he said, exists for accurate conversions from one hardness scale to another, defining the limits of the field covered and the accuracy with which conversions can be made. It would also be desirable for such a table to give the significant Meyer constants and physical properties over the range covered, he said, recommending that the society take this work in charge.

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THE largest hone abrading tool ever made was recently shipped to a war contractor by Micromatic Hone Corp., 8100 Schoolcraft, Detroit. This hydraulically controlled hone is 4½ in. in diameter by approximately 63 ft. long overall, and weighs approximately 6500 lb. It is intended for use in a bore 40 ft. long and it is anticipated that approximately 1/16 in. of stock on diameter must be removed to clean up the bore. This will amount to approximately 1990 cu. in. of metal removal, or more than 550 lb. of metal to be removed by the hone abrading process. Calibrations in the head assembly provide for hydraulic actuation of the cones in steps of 0.0004 in. Head is joined to the 10-½-in. tube by a double balled universal joint. The tool is used in a special horizontal honing machine built by the Barnes Drill Co., Rockford, Ill.

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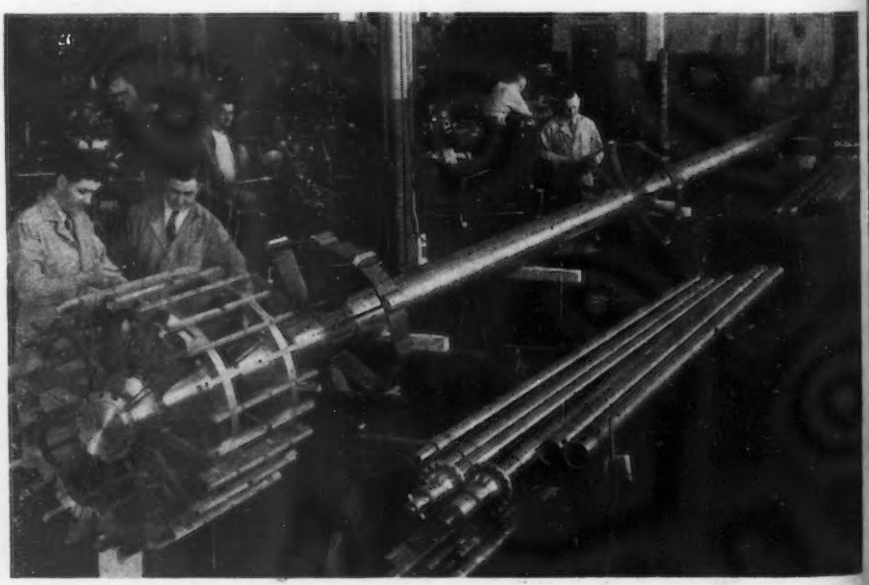

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Assembly Line . . .

STANLEY H. BRAMS

• Packard takes over operation of big plant at Toledo . . . Continental continues to extend its operations . . . Farm tractor production lines at Ford will resume soon, after long idleness.

DETROIT Packard Motor Car Co., builder of the Rolls-Royce Merlin aircraft engine, this week revealed that it was taking over the operation of the Aviation Corp.'s new $5,000,000 liquid cooled engine plant at Toledo. The contract for building the liquid cooled engine, around which a new type fighter ship was being designed by Vultee, was cancelled some weeks ago.

Packard is planning to use this large plant for producing sub-assemblies, such as super-chargers, and parts for the Rolls-Royce engine, for assembly in Detroit. It is planned to process several hundred parts at Toledo which are now machined at Detroit, thus permitting expansion of engine production at the Detroit unit.

Occupancy of the plant is already underway, with production scheduled to begin within a few weeks and full capacity to be reached before the end of the year. It is estimated that the annual payroll will run about $10,000,000. Machinery and equipment already in the Toledo plant can be converted to the new work, Packard reported, and such new tools and equipment as will be required have already been ordered.

The new Toledo unit will be headed by R. R. Rees, chief plant engineer of the Packard Detroit plant. His position as chief plant engineer will be filled by K. R. Parker, former construction engineer of the Packard aircraft division.

THE problem of keeping accounts on the rapid expansions of the automotive companies is one that taxes the skill of Detroit statisticians. Take for example, Continental Motors Corp., and its majority owned subsidiary Continental Aviation & Engineering Corp. With upwards of 17,000 employees scattered through six major plants, this company stands at the brightest point of its long history.

The new C.A.E. plant at Muskegon, Mich., built to produce advanced trainer plane engines, is now in the forward stages of operation. Hiring of machine tool operators began in January of this year. Initial shipment of spare parts started in March, while assembly of the first engine was going forward. On April 16 the first engine was completed, little more than nine months from the date of the first excavating. This record was achieved in the face of major difficulties in obtaining machine tools.

Today the plant is on schedule in producing both finished engines and parts for a so-called 975-4 air-cooled radial engine, turning up 650 hp. and built under Pratt & Whitney licenses.

Continental has not only increased its operations vastly in the aircraft field, but it has also taken a place as the largest producer of tank engines and has now extended its operations to cover the fractional horsepower field. Arrangements have been completed for the purchase of 72 per cent of the stock of Wisconsin Motors Corp., Milwaukee. This plant makes a variety of fractional and small horsepower motors.

The company also has hopes of continuing business after victory in Texas, where it recently took over the operation of plants originally built for Guiberson Diesel Co.

As matters stand today, the various plants are equipped with somewhere around 7000 machine tools and occupy well over 1,500,000 sq. ft. of factory space. Annual volume, at capacity, on existing commitments is around $300,000,000.

Farm tractor production lines of Ford, after being idle since March, are expected to resume operations early this month. WPB edict has limited tractor production to 25 per cent of the 1940 or 1941 base, whichever was largest. In the case of Ford-Ferguson, it was the 1941 figure.

International News Photo

VISITOR TO WILLOW RUN PLANT: Vice-president Henry A. Wallace poses in front of a plane with Henry Ford at the Willow Run Bomber Plant. The vice-president had just chalked a "Good Luck" message on the plane.

Typifying the many-sided picture that is Ford at war, the company has revealed that it will soon reach production schedules set by the army for anti-aircraft gun directors which it is building. There are more than 12,000 parts to the director being built by Ford. Many of the parts are so intricate and call for such precision that difficulty was experienced in developing adequate gaging systems. Despite these problems, the company succeeded in May in reaching a production rate which equalled that of the company which originally developed and made the director.

Still another angle of Ford's war effort which recently came to light was the unveiling, publicly, at least of a new 500-hp., V-8 tank engine. This unit has been in production for more than a year at the Lincoln plant at Detroit but only recently was shown to the public. In recent tests at Fort Knox this liquid-cooled engine was said to have led in endurance tests and to have topped all other engines in nearly all phases of per

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There is no better paying investment than the right tools for the job.

formance. Its design lends it to assembly line production.

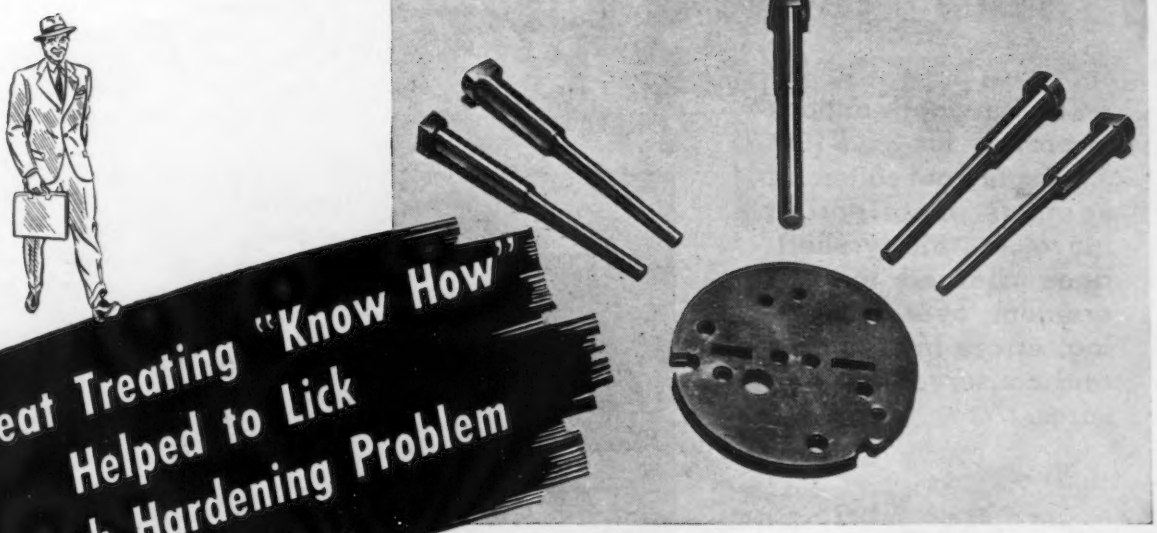
Basic specifications were taken from a 12-cylinder aircraft engine built by Ford as an independent project in 1940 and 1941. As the urgent need for increased production of tank engines arose in 1941, negotiations were completed for the new 8-cylinder job. With the assistance of Army Ordnance experts, the necessary changes were made in the cut-down V-12, with a clutch and a flywheel being added and the fuel, ignition and lubrication systems being altered. In January, 1942, Ford received the go-ahead signal for quantity production of the engine and, by adapting the design to automotive machinery and tools on hand, the first engine came off the line in April, 1942.

Production for Sale in June Off Slightly from May

Source: American Iron and Steel Institute

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export *	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export *	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	44	1	xxxxxxx	689,551	xxx		188,283	4,079,568	xxx		1,174,127
	Heavy structural shapes	10	2	5,412,580	279,717	62.8		xxxxxxx	1,886,415	70.2		xxxxxxx
	Steel piling	4	3	338,000	4,660	16.8		xxxxxxx	14,064	8.4		xxxxxxx
	Plates—Sheared and Universal	21	4	9,189,740	1,004,005	132.8		2,169	6,399,825	140.4		19,380
	Skelp	6	5	xxxxxxx	65,648	xxx		34,228	401,239	xxx		211,929
	Rails—Standard (over 60 lbs.)	4	6	3,629,260	145,589	48.8		xxxxxxx	893,169	49.6		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	15,243	59.8		xxxxxxx	81,759	53.2		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,021	12.2		xxxxxxx	12,887	25.5		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	51,991	56.4		xxxxxxx	323,873	58.3		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	570,295	xxx		89,934	3,548,636	xxx		472,892
	Concrete reinforcing—New billet	15	11	xxxxxxx	41,315	xxx		xxxxxxx	214,153	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	10,028	xxx		xxxxxxx	47,501	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	145,509	xxx		xxxxxxx	877,532	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	264,382	xxx		37,700	1,525,007	xxx		229,188
	Cold finished	19	15	xxxxxxx	44,002	xxx		xxxxxxx	240,437	xxx		xxxxxxx
	Hoops and baling bands	4	16	xxxxxxx	11,710	xxx		xxxxxxx	51,332	xxx		xxxxxxx
	TOTAL BARS	63	17	14,696,525	1,087,241	89.9		118,634	6,504,598	89.2		702,080
	Tool steel bars (rolled and forged)	17	18	200,840	19,231	116.4		xxxxxxx	119,787	120.2		xxxxxxx
	Pipe and tube—B. W.	15	19	2,231,040	109,516	59.7		xxxxxxx	655,017	59.2		xxxxxxx
	L. W.	8	20	845,400	47,862	68.8		xxxxxxx	282,911	67.4		xxxxxxx
	Electric weld	8	21	1,149,250	95,292	100.8		xxxxxxx	519,395	91.1		xxxxxxx
	Seamless	15	22	3,082,400	168,848	66.6		xxxxxxx	1,061,468	69.4		xxxxxxx
	Conduit	7	23	190,000	5,291	33.8		xxxxxxx	31,362	33.3		xxxxxxx
	Mechanical Tubing	11	24	597,800	61,573	125.2		xxxxxxx	373,676	126.0		xxxxxxx
	Wire rods	22	25	xxxxxxx	102,266	xxx		19,666	597,871	xxx		118,833
	Wire—Drawn	41	26	2,566,150	160,653	82.5		5,167	975,267	83.1		29,077
	Nails and staples	19	27	1,116,640	67,560	73.5		xxxxxxx	424,581	76.6		xxxxxxx
	Barbed and twisted	15	28	482,280	21,062	53.1		xxxxxxx	122,087	51.0		xxxxxxx
	Woven wire fence	16	29	778,060	21,450	33.5		xxxxxxx	106,402	27.6		xxxxxxx
	Bale ties	12	30	128,420	10,404	98.5		xxxxxxx	55,485	87.1		xxxxxxx
	All other wire products	8	31	78,220	5,039	78.3		xxxxxxx	31,088	80.1		xxxxxxx
	Fence posts	11	32	112,065	2,893	31.4		xxxxxxx	11,868	21.3		xxxxxxx
	Black plate	10	33	339,700	27,766	99.3		-	147,902	87.8		-
	Tin plate—Hot rolled	4	34	483,620	1,383	3.5		xxxxxxx	9,551	4.0		xxxxxxx
	Cold reduced	10	35	3,841,340	218,607	69.2		xxxxxxx	1,076,259	56.5		xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	474,993	xxx		19,879	3,017,737	xxx		100,256
	Galvanized	14	37	xxxxxxx	64,759	xxx		xxxxxxx	401,889	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	124,089	xxx		xxxxxxx	737,825	xxx		xxxxxxx
	All other	14	39	xxxxxxx	31,992	xxx		xxxxxxx	183,068	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	695,833	62.7		19,879	4,340,519	64.8		100,256
	Strip—Hot rolled	22	41	3,200,890	121,548	46.2		14,232	765,901	48.2		85,368
	Cold rolled	39	42	2,057,340	98,672	58.3		xxxxxxx	568,121	55.7		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	17,576	50.3		xxxxxxx	111,863	53.1		xxxxxxx
	Axles	6	44	453,470	13,189	35.3		xxxxxxx	83,294	37.0		xxxxxxx
	Track spikes	11	45	308,350	12,444	49.0		xxxxxxx	76,064	49.7		xxxxxxx
	All other	5	46	42,000	13,969	404.2		xxxxxxx	99,937	479.6		xxxxxxx
	TOTAL STEEL PRODUCTS	159	47	xxxxxxx	5,464,595	xxx		402,258	33,245,073	xxx		2,441,030
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	728,676	xxx		355,637	4,483,259	xxx		2,142,381
	Ingot moulds	5	49	xxxxxxx	79,053	xxx		xxxxxxx	479,269	xxx		xxxxxxx
Iron Products	Bars	10	50	170,110	7,965	56.9		298	49,212	58.3		1,679
	Pipe and tubes	2	51	106,000	6,409	73.5		xxxxxxx	43,686	83.1		xxxxxxx
	All other	1	52	56,000	718	15.6		-	7,340	26.4		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	15,092	xxx		298	100,238	xxx		1,679

Total number of companies included, 183. During 1942, the companies included above represented 98.8% of the total output of finished rolled products. * In accordance with Government policy, export figures cannot be published.



How Heat Treating "Know How" Helped to Lick a Tough Hardening Problem

Here is an on-the-job story of how Carpenter tool steel and the practical knowledge of a Carpenter representative teamed up to solve a tough tool steel problem. The facts are summarized below. The tools and work involved are shown in the photograph.

THE JOB:

Punching 3/4 hard brass (Rockwell B-79), .137" and .150" thick, in a double acting 250-ton punch press. The holes to be punched vary from .099" to .167".

PROBLEM:

Preventing cracking of punches under the head during hardening, avoiding decarburization and keeping the punches straight in quenching. About 75% of the punches hardened had been cracking in the shoulder under the head in the hardening process.

SOLUTION:

The Carpenter representative, when asked for advice, made the following suggestions: First, to use the recommended furnace atmosphere of 2% to 4% oxygen. Second, to switch from a tap water quench to one of 10% brine. Third, to heat the punches in a piece of 3/4" round iron pipe (both ends open)—so that the punches can be dropped vertically into the brine to get a full quench under the head.

RESULT:

On the first try following these recommendations, some 200 punches made from Carpenter Green Label Drill Rod were hardened, using a temperature of 1450° F. with an atmosphere of 2% to 4% Oxygen. The problem was licked! Decarburization was eliminated and all were O.K. for straightness. In production they averaged 100,000 holes per punch.

• If *you* have a tool steel problem—or if you should like help in getting tools that give longer uninterrupted production runs—your nearby Carpenter representative will be glad to give you every assistance. He can supply you with helpful printed matter—he can render personal "on the spot" service—and he will keep you in touch with the Carpenter Metallurgical Department.

THE CARPENTER STEEL COMPANY
121 Bern St., Reading, Pennsylvania

Carpenter MATCHED TOOL STEELS

Washington . . .

L. W. MOFFETT

• Civilian goods outlook improves for mid-1944 . . . Home front softening seen as pre-election move . . . Many shortages charged to government over-purchasing, errors in rationing and conservation measures.

NEW GENERAL MANAGER FOR OPA: Chester Bowles, left, new general manager of OPA is greeted by Prentiss Brown, OPA's top boss.

WASHINGTON—A size up of the prospects for more civilian goods forces the conclusion that by the end of the year inventories will be fair. Based on the present outlook by mid-1944, the only demands which will be left unfilled will be for new automobiles and gimcracks.

As the war comes closer to an end, it is predicted that public officials will declare that since military operations have been so successful, restrictions can be lifted on the manufacture of tens of luxury items and hundreds of necessary articles made of metal. This will only be partly true.

The wisdom and necessity of restricting civilian production drastically at the beginning of the war so that heavy industries could convert to weapon production can never be questioned. But orders to cease production of many articles necessary to the home owner and worker were foolish because the amount of metal saved has been infinitesimal.

Many government officials attribute the severe lack of metal goods to the fact that the military services have overbought them and now have them stored away in warehouses. The Truman (Senate) Committee will make a report around the middle of September revealing the degree of Army purchases and WPB bigwigs in the know say that military supplies will prove to be gigantic.

Nevertheless, the armed services were confronted with the Herculean task of quick mobilization of such colossal proportions as were never before approached. Hence their early zeal for too much will excite sympathetic understanding, rather than condemnation. But now that more orderly buying is possible, the armed services are expected to more closely fit purchases with requirements with a safe margin to guarantee security.

Factors which are persuasive to the belief that consumer goods soon will become more plentiful are: (1) The imminence of elections; (2) The recent request of War Mobilization Director James F. Byrnes to WPB Chairman Donald M. Nelson for a list of consumer goods needed; (3) The letter of Arthur D. Whiteside, WPB Vice Chairman for Civilian Requirements, to all members of Congress asking for Congressional cooperation in fixing needs and promising their fulfillment wherever possible, and (4) The OCR request for approximately 140,000 tons of steel for delivery in the fourth quarter of this year (see THE IRON AGE of July 22, page 99).

RATIONING restrictions on gasoline in the East will soon be eased and as President Roosevelt announced in his broadcast last week, coffee rationing has been lifted. Sugar rationing may be next. Political observers say that these are unmistakable signs that the administration is going to fight a softer war on the home front prior to elections.

Mr. Byrnes' letter to Mr. Nelson says in effect that wherever WPB justifies a greater supply of civilian goods, they will be made.

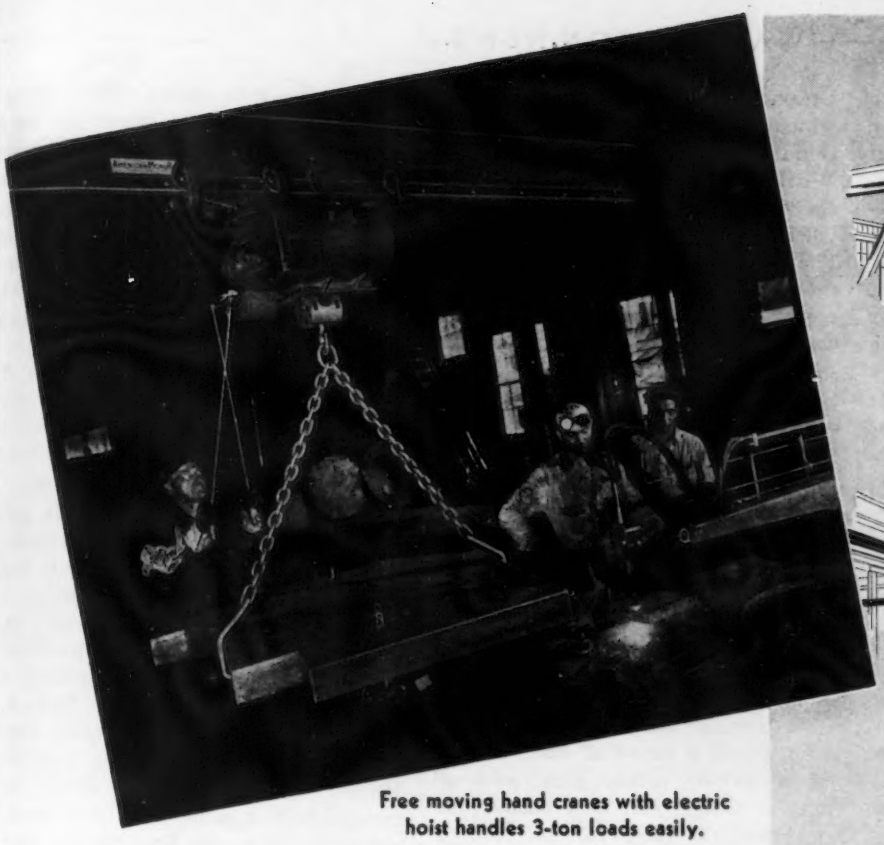
Mr. Whiteside tells Congressmen significantly: "From the information now available, I think the total volume of civilian business in this country for the last six months of this year will be at least 20 per cent less than last year. Many business concerns will suffer a loss in volume and in some cases a serious loss.

"Many of the articles which are not obtainable are not essential. When they are essential, we are trying to get production started, although this production must in many cases be on a limited basis.

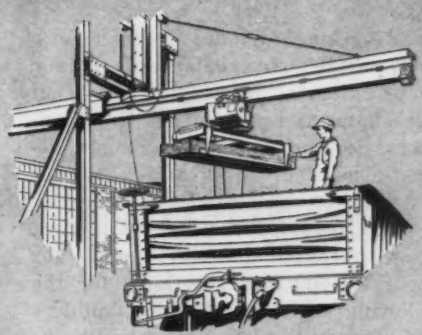
"As you know, the period from the raw material to the finished article on the shelves of the retailer is seldom less than four months.

"You can assure your constituents that we are doing everything possible to take care of their essential needs. Extensive field surveys which will detect national and local shortages are nearing completion, and every day adds to our knowledge of what must be supplied to maintain the domestic economy."

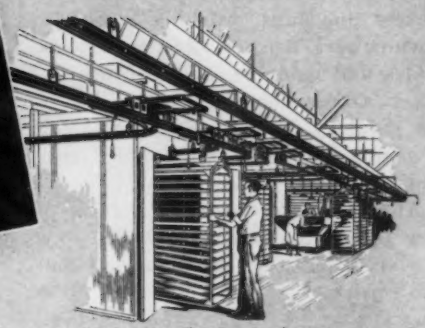
The articles for which OCR is re-



Free moving hand cranes with electric hoist handles 3-ton loads easily.



Unloading crane ties in with plant storage area.



Racks handle finished parts through drying ovens.

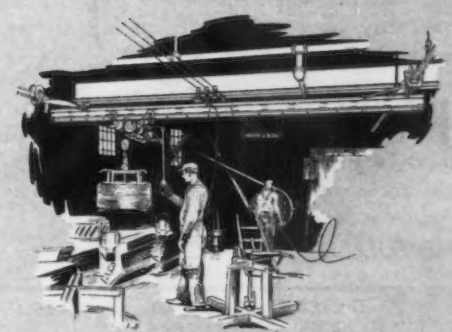
FOR THE DURATION AND LONG AFTERWARDS

American MonoRail Equipment offers versatile application without costly adjustment or lengthy engineering.

YOU can better your production NOW—later in the post-war period you will have essential equipment available for changes in product or process.

American MonoRail handling equipment is extremely flexible. Standard parts fit quickly and easily into complete systems that solve a wide range of handling problems.

Don't let your handling problems impede your war work. Let our engineers show you how to speed up NOW with an eye on easy, inexpensive adjustment when Victory is ours.



Stripping crane speeds up removal of wire coils.

Crane over storage area moves steel easily.

THE AMERICAN MONORAIL CO.

13103 ATHENS AVENUE ★ CLEVELAND, OHIO

questing steel include: Ice refrigerators, portable electric lanterns, animal traps, kitchen, household and other miscellaneous articles, cast iron radiators, cooking stoves and ranges, domestic heating stoves and warm air distribution equipment and furnaces.

WPB industry divisions will turn up with fourth quarter requests for about 100,000 tons additional for the following articles: Bicycles, builders and luggage hardware, jewelry, sporting goods, metal doors and identification plates, badges, emblems, pintickets and tags, washing machines, lawnmowers, needles, silverware, tools, scales and balances, and lighting fixtures. Other items are on the list of the industry divisions. The foregoing is just a sample of what WPB may make available for civilians.

At this rate, it is evident that WPB now thinks that about 1,000,000 tons of steel will satisfy minimum civilian and product requirements. WPB knows that it has allowed civilian goods to reach a dangerously low level, perhaps lower than they have been in 75 years. Retailers report that they have practically no metal goods.

TO show how civilian demand has needlessly suffered, WPB and other government officials now say that there never was any reason to ration shoes. Electric light bulbs, which are getting scarcer and scarcer could be plentiful if somebody in WPB hadn't miscalculated the need for fine tungsten wire and had provided enough wire making machinery. The electronic industry's demand, in the making of radars and other equipment, plus accelerated demands of war factories have so strained wholesalers supplies that present inventories are about 25 per cent below normal. There is a deficit of more than 10,000,000 bulbs, it is reported. Trade sources say about 1000 tons of steel a year would take care of demand for pocket knives needed by farmers, mechanics and fishermen. Yet, hardware stores report that they haven't had any knives for a long time. Kitchen knives have also disappeared from the stores, yet a minor tonnage of steel is needed for this.

The average alarm clock only takes about a half a pound of steel, according to WPB; safety pins, and all kinds of ladies' hair and bobby pins are difficult to buy. But one ton of steel will furnish about 1,000,000 safety pins! Garbage and trash cans, cooking utensils and an endless list of items which also consume thimblefuls of steel have had their production limited.

When J. Q. Public has had the nerve to ask why this is, someone is likely to retort "Which would you rather have, a stew pot or a battleship?" Poor J. Q. is always floored by this equivocal question. He knows there is but one answer.

The people are getting a little weary of being told by their government that civilian goods in the stores means that they can and will give up trying to win the war through production efforts. One million tons of steel is about one sixty-third of our annual finished steel capacity and it will be hard to convince the ordinary citizen that it cannot be spared.

Furthermore, J. Q. Public is getting a little bored with the sadistic cant that if a person is unable to buy a carpet sweeper in Moscow or a washing machine in Dover, an American citizen should be punished by not being able to purchase a packet of straight pins in Newark. The administration is belatedly finding this out but still thinks that the United States citizenry should be treated to the same war time standard of living as the English, the Russians and the Chinese, where of necessity civilians must suffer.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THEY'VE MADE A SORTA MONUMENT OF THAT OLD SHAPER TO COMMEMORATE WHERE THE OL' MAN AN' OTHER DIGNITARIES OF THIS NOW FAMOUS PROFESSION GOT THEIR START
BUT LIKE ALL BIOGRAPHIES OF GREAT MEN, THEY CHEAT-- NOW THERE THEY'VE LEFT OUT TH' PADDED KEG SEAT FOR TH' DAY SHIFT AN' TH' BOARD WITH A WASTE PILLOW FOR TH' NIGHT SHIFT.
THE GODS WERE HUMAN
J.R.WILLIAMS 8-6
REG. U. S. PAT. OFF.
COPR. 1943 BY NEA SERVICE, INC.

OPA Farm Equipment Advisory Group Named

Washington

• • • **Twelve officers** and executives of wholesale distributing houses, mail order firms and cooperative distributing agencies were appointed last week by OPA to serve on a Farm Equipment Suppliers' Advisory Committee.

The committee will advise OPA on industry matters and assist in studies of pricing problems and actions affecting the industry at the distribution levels.

Those appointed are:

W. F. Carroll, manager, Farm Equipment Division, Montgomery Ward & Co., Chicago; Howard A. Cowden, president, Consumers Cooperative Assn., North Kansas City, Mo.; I. H. Hull, general manager, Indiana Farm Bureau Cooperative Assn., Indianapolis, Ind.; Russell G. Lindsay, president, Lindsay Brothers, Inc., Milwaukee; C. J. Reilly, president, Reilly & McGravy, Brooklyn; C. N. Silcox, Cooperative G. L. F. Exchange, Inc., Ithaca, N. Y.; C. A. Coggin, manager, The H. C. Shaw Co., Stockton, Cal.; L. A. Hardison, sales manager, Stratton-Warren Hardware Co., Memphis, Tenn.; H. R. Kimmel, manager, Farm Equipment Div., Sears, Roebuck & Co., Chicago; Wade Newbegin, president, R. M. Wade & Co., Portland, Ore.; M. O. Sackheim, president, The Brown Fence & Wire Co., Cleveland; E. A. Syftestad, general manager, Farmers Union Central Exchange, Inc., St. Paul, Minn.

Specify SHEFFIELD ARMY-NAVY

AERONAUTICAL TAPER PIPE THREAD GAGES

★ ★ ★

All styles of Taper Pipe Thread Gages included in Specification AN-GGG-P-363 for the inspection of aircraft fuel and oil line connections, are available from Sheffield.

Write for Bulletin #43-1 describing the use of one and three-step L_1 and L_3 plugs, 6-step plain plug, L_1 and L_2 thread rings, the 6-step plain ring—and other gages used in aircraft parts inspection.

L_1 Taper pipe thread plug Nitrigage single-step, Style 4000.
L_2 Pipe thread ring Nitrigage, Style 4003.
L_3 Taper pipe thread plug Nitrigage 3-step, Style 4005.
L_1 Taper pipe thread plug Nitrigage 3-step, Style 4002.
L_1 Taper pipe thread ring Nitrigage basic, Style 4001.
L_1 Taper pipe thread plug Nitrigage single-step, Style 4004.
Plain taper ring Nitrigage 6-step, Style 4007.
Plain taper plug Nitrigage 6-step, Style 4006.
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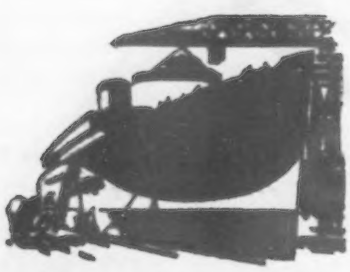
THE SHEFFIELD CORPORATION

Dayton, Ohio, U.S.A.

WEST COAST . . . OSGOOD MURDOCK

• Small Seattle firms pitch in to help ease Boeing labor crisis . . . Tank production schedule terminated . . . Ten-hour shifts meet cold reception.



SEATTLE — The heaving industrial bosom of the Puget Sound area breathes more gently again following dispersal of rumors that the bulk of the smaller plants and shipyards here would be shut down to provide workers for Boeing.

The green-eyed sea monster which both Boeing and the smaller plant officials thought they saw approaching in the misty future has turned out to be no more than a whale of a labor utilization problem now that the pattern of concentrating given types of industry in certain areas has become clearer.

Paul Pigott, president of Pacific Car & Foundry Co., announces that the manufacturing schedule for Gen. Sherman medium tanks on which that company is currently engaged will be terminated at the end of 1943. This follows in the tracks of an announcement made weeks ago by General Motors that its southern California plant would cease production of light tanks and turn the plant over to Douglas Aircraft Co. Other than a statement that Pacific Car would continue its present schedule of production without a change in personnel, operations, or plans, nothing was divulged as to what manufacturing program Pacific Car would follow in 1944. In line with the program to concentrate medium tank production at a few plants throughout the country, while other plants and areas specialize in aircraft production or other items of materiel, a possibility may be conceded that Pacific Car will broaden its program of manufacture of aircraft components, logging and marine equipment. On the other hand, the plant might become a prime unit in the Boeing plan of farming out subassemblies to scattered plants.

Pacific Car's new plant, in a Seattle suburb, where the tank schedule is under way, is four times as large as its predecessor. In fact, it is referred to locally as the most modern and complete in the United States, inasmuch as it was built to order for war production. This foundry uses 75 per cent scrap, all of it secured in the Pacific Northwest. Fortunately, a period of shortage four or five months ago which actually put production behind schedule has ended and supplies are ample. From the standpoint of industrial relations, Pacific Car could issue a very nice prospectus showing that tile showers and lockers are available for all employees.

Seven Seattle textile manufacturers who had faced concellation effective Aug. 1, of Army contracts totaling $145,000, apparently on the theory that their workers would be released for work at Boeing, were overjoyed last week by news that the contracts would be reinstated. This reinstatement follows similar action on contracts held by small shipyards engaged in tugboat building, which also had been informed that their contracts would be cancelled. Prior to the reinstatement actions, the War Department was reported to be considering cancellation of $40,000,000 to $100,000,000 in war contracts held by small firms in the area. Such a deep rooted scare did local business men receive from the threatened cancellations, however, that they immediately organized a community campaign to recruit 9000 workers for Boeing, concentrating their efforts on housewives and commercial workers. One Seattle manufacturer, Pacific Huts, Inc., pledged the entire labor recruiting facilities of his company, including advertising, to recruiting workers for Boeing. Virtually every participant in a meeting called by the Manufacturers' Association of Washington promised to direct his job applicants to Boeing and to refrain from hiring for his own organization, however urgent his need might be, until Boeing gets its necessary 9000.

Meanwhile Boeing took definite steps to help itself. Eight or nine branch plants, in addition to one already nearing completion, will be established in such smaller Washington cities as Bellingham, Tacoma, Chehalis, Olympia, Everett, Hoquiam and Stanwood, a step pointed out as a possibility in this column last week. This is the same plan of action taken by Consolidated when San Diego's labor pool had been fully absorbed. The big difficulty encountered by Boeing in manning its Seattle plant lies in securing graveyard shift workers. Most applicants are women, and 80 per cent of the prospective workers have refused to work on other than the already saturated day shift. A company proposal, reportedly at instigation of the War Department, to operate the plant on two 10 hr. shifts was scornfully rejected by the Aeronautical Mechanics' Union, bargaining agent for Boeing labor. From the labor standpoint, the 10 hr. shift plan would have made possible application to the War Labor Board for wage differentials to offset the present unattractive scale imposed by the Aircraft Stabilization Committee of the WLB. Union officials failed to reach an agreement with the company on the amount of differentials for night workers on the 10 hr. shift basis, leading to rejection of the two shift plan as a whole.

AS a substitute measure for making Boeing employment more attractive, the WPB, as this is written, is reported to be working on an incentive bonus plan for presentation to the union. P. G. Johnson, Boeing president, has expressed skepticism of the adaptability of such a plan to aircraft production.

Two leaks in the Boeing labor reservoir have been plugged. Col. Walter DeLong, state selective service director, has ordered all local boards in the state of Washington to postpone until Sept. 26 induction of any employee of the Seattle division of Boeing. WMC has halted the issuance of certificates of availability by the United States Employment Service to any worker in the state of Washington wishing to work in Alaska or any United States territory.

Industrial nascence in this area has not been entirely halted by the Boeing labor crisis however. Isaacson Iron Works is completing installation of their second 25 ton electric melting furnace to be devoted to production of forging ingots. Ingot production

Versatile Harvest

Suppose the earth crossed the path of some mysterious ray, causing all wood products suddenly to vanish! Such a startling event would dramatically emphasize wood's indispensability — would make most of us realize wood's real importance in man's progress.

Economical, efficient harvesting of this versatile forest crop became possible when powerful logging machinery was developed to replace manpower and horsepower. Today much of this equipment depends on Twin Disc Clutches for the application and control of power.

The Twin Disc Hydraulic Torque Converter is another good example of how the Twin Disc Clutch Company's twenty-five-year-old research and development policy adds to everyone's comfort and well-being. The Torque Converter gives to logging equipment performance characteristics which make for lower costs, increased safety and greater speed in logging operations.

The reputation for dependability and durability which Twin Disc Clutches and Hydraulic Drives have earned on the job of bringing logs out of the woods is a direct result of our specialization in the design and manufacture of industrial clutches. If you are building, or plan to build in the future, equipment using clutches, or hydraulic drives, get in touch with Twin Disc engineers today. TWIN DISC CLUTCH COMPANY, Racine, Wis.

THE Twin Disc Hydraulic Torque Converter (Lysholm-Smith Type) eliminates gear-shifting, multiplies an engine's torque. It cushions shock loads, prevents engine stalling or damage, handles heavy loads without jerking.

should exceed immediate needs of Isaacson, presumably making available the surplus for other forge shops.

Fulfilling a long-thwarted civic desire, WPB has agreed to establish a separate new Pacific Northwest region, with regional offices at Seattle. The new region, most of which will be lopped off the present six state San Francisco region, marks the first defeat in WPB's long fight to ward off slighted civic and political groups. War Manpower Commission will undoubtedly be the target for a renewed attack to establish a separate region for this area also.

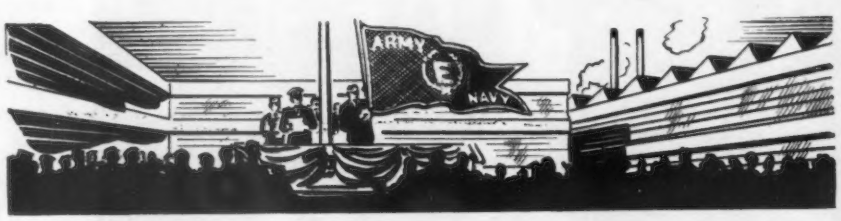
KICKED about by the San Francisco Bay Region, and given the cold shoulder by the Pacific Northwest, the two 10 hr. shift basis of operation has received no warmer welcome in southern California. California Shipbuilding Corp. describes the plan as "the most popular rumor in the yard for over a year," and sees no reason to change from the present three 8 hr. shifts. Consolidated Steel's fabricating plant at Maywood has been operating on the 10 hr. shift plan for some time, but all its shipyards are on the three shift basis. Douglas Aircraft is on the three shift basis and expects to continue unless requested by the government to do otherwise.

Most aircraft companies feel that a 10 hr. shift would be too hard on the workers, now predominantly women.

Southern California aircraft companies have sought to lure job-seekers through radio and newspaper advertising, billboards, and even personal appeals through the medium of speakers at group meetings. Some companies offer part-time and double duty shifts for business and professional men and hire school boys in an effort to maintain adequate working forces. Despite these efforts, most major critical plants have been undermanned to the extent that labor supply has been a severe limiting factor in production. Last week, after months of rumors, WMC put in its oar. Los Angeles County was classified as a No. 1 critical labor shortage area, effective Aug. 1. This means that, in addition to the 48 hr. week and job stabilization programs now in force, new war contracts will be placed elsewhere whenever possible. The new contract ban will not affect the major aircraft and shipbuilding concerns whose backlogs are sufficiently large to practically assure capacity operation for the duration, nor will it quarantine contracts for less than $50,000 and those awarded to concerns with less than 100 workers, nor plants certified by Smaller War Plants Corp. The exception of the smaller plants means much to Los Angeles, which boasts an extremely large number of small industrial concerns.

AN unexpected steel production cost factor last week leaked out of San Bernardino County, California, orange groves to plague Henry Kaiser, who at one time had stated that modern equipment of his Fontana plant would make it one of the lowest cost producers in the nation. By personally pleading with the county board of supervisors, Kaiser succeeded in convincing them that they should whittle down the assessed valuation of the Fontana plant from $12,368,000 to $8,670,000. He had requested that the plant be assessed at $2,980,000. Kaiser Co., Inc., had produced experts to state that the originally proposed valuation would put a tax load of $1.48 a ton on semi-finished products and $1.89 per ton on finished products compared to the average tax in similar mills of 36c. The company stated that "normal practice" would have reduced the assessment to $1,680,000, considerably less than the figure it quoted as satisfactory.

To the general public, the episode had greatest interest in a statement by Kaiser that his personal investment in the Fontana mill, described as a 100 million dollar project in press reports, was $7,500,000, and that he had pledged the earnings of his shipyards to help pay off the RFC loan on the plant. He pointed out with logic that the government would hesitate to advance additional money for installation of electric furnace capacity if the county government insisted upon excessive tax valuation. By the time the hearing ended, the county officials apparently were in a more reasonable frame of mind, and the way was paved to a future equitable adjustment.



. . . Cited for Awards . . .

• • • The following companies have been awarded the Army-Navy "E" for excellence in war production.

Driver-Harris Co., Harrison, N. J.

•

Divine Brothers Co., Utica, N. Y. (renewal star).

•

Allis-Chalmers Mfg. Co., La Porte Works, Ind.

•

American Car & Foundry Co., Berwick Plant, Pa.

•

American Cyanamid & Chemical Corp., Little Rock, Ark.

•

Apco-Mossberg Co., Attleboro, Mass.

•

Bell Machine Co., Oshkosh, Wis.

•

G. H. Bishop Co., Chicago.

•

Camillus Cutlery Co., Camillus, N. Y.

•

Century Boat Co., Manistee, Mich.

•

Dewey & Almy Chemical Co., Cambridge Plant, Cambridge, Mass.

•

Eitel McCullough, Inc., Salt Lake City Plant.

•

Fansteel Metallurgical Corp., North Chicago Plant.

•

S. W. Farber, Inc., Ridgewood Plant, Brooklyn.

•

Gates Rubber Co., Denver.

•

General Machine & Mfg. Co., Berwick Plant, Pa.

•

Indian Motorcycle Co., Springfield, Mass.

•

Charles Lenning & Co., Bridesburg, Philadelphia.

•

Link-Belt Co., 39th Street Plant, Chicago.

•

Modine Mfg. Co., Racine Plant, Wisconsin.

•

Seymour Products Co., Seymour, Conn.

•

Simmons Co., Elizabeth Plant, N. J.

•

Standard Wholesale Phosphate & Acid Works, Inc., Curtis Bay Plant, Baltimore.

•

Steel Products Co., Inc., Savannah, Ga.

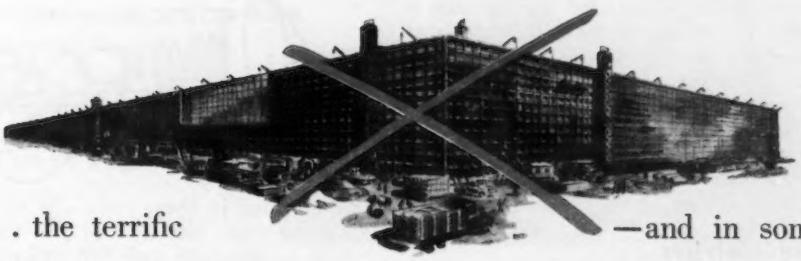
•

Tantalum Defense Corp., Plancor 495, North Chicago.

•

United States Spring & Bumper Co., Vernon, Cal.

PART of the War IS OVER



Part of the war . . . the terrific battle to quickly build up production capacity of war materials . . . is over. The productive capacity of many new plants has far exceeded early estimates . . . as a result the inefficient producers will be curtailed and competitive conditions will return.

And competition means that frozen designs must be thawed—developments for the future must be brought nearer the production stage. Builders must be able to offer better machines —and in some cases must use less critical materials.

Vickers Hydromotive Controls provide a most important design resource for improvement of machines in the important fields of better control—higher production rates—wider utility—greater safety and the elimination of operational difficulties.

You will find it advantageous to have a Vickers Application Engineer discuss with you the possibilities of improved machine controls.

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Fatigue Cracks . . .

BY A. H. DIX

Buck Rogers Auto Threat Groundless

• • • The most reassuring news item we have seen recently in your favorite family journal is this from the July 15 "Assembly Line":

> When the war ends, there will be a frenzied rush to get cars into the field; 1942-type models will be offered. Thereafter there will likely be a heavy volume of sustained demand . . . it would be unlikely that the automotive industry would strain itself to produce the new types of cars as promised by the Sunday supplement sections and other such daydreamy writing.

Frightened no end is what we were over the talk about postwar cars of Buck Rogers design, and it is a weight off our mind to know that we will be able to drive our 1940 Dodge Deluxe complete with white wall tires, with cigar lighter, and airfoam seats, without attracting a crowd of curiosity seekers at every stop. We are pretty well satisfied as it is, and will be wholly contented if the Dodge people confine their postwar plans to changing the front doors so that they open more than quarter way and raise the rear view mirror so it is not smack in the way of our front view.

Field Day for Psychiatrists

• • • Something else we v. with a. are the threatened developments in house construction, especially movable partitions. The dimensions of a room, it seems to us, should be no more mutable than the laws of the Medes and the Persians. Life has enough uncertainties without forgetting in the middle of the night that the bedroom door was moved three feet nearer the bathroom over the last weekend. And a man in a living room with progressively contracting walls, owing to something the little woman read in *Better Homes and Gardens* is sure to acquire the same brand of heeby-jeebies that eventually did for the prisoner in Edgar Allan Poe's story who found his cell was a hydraulic press in slow motion.

Eyes That Never Close

• • • Most disturbing of all postwar rumors are those concerning the photo-electric cell. We hear that wherever you go you will find one of those unblinking electric eyes staring at you. They will take over practically all the little household tasks, such as turning on electric lights, raising the shades, turning off the tea kettle, opening doors, and shutting off the shower.

Frankly, we would just as soon the electronics people left these simple duties to us, as we like to feel that we are doing our share of the world's work. If they are hell bent on inventing things let them make an automatic window washer, a gravel driveway weed-killing ray, and something to wash, dry, and put away the dishes.

No Aptronymic Dud

• • • Plain ignorance is why we couldn't see what was aptronymic about E. W. Blank being the name of an analytical chemist, as reported by Miss Anna Louise Nestmann. D. A. Cotton, of the Delco-Remy Process Laboratory, explains:

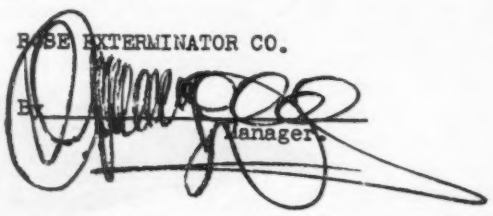
> In making an analysis for a certain element by volumetric methods, a ***blank*** test is always run using all the reagents in the same amounts as in the regular analysis, in order to make sure that none of the elements looked for in the analysis is present in the reagents. The blank reading is subtracted from the analytical result to obtain the correct amount present in the same being tested.

Thus Miss Nestmann is vindicated, but we still think it would be nice if, instead of working for Colgate-Palmolive-Peet, E. W. Blank got a job with Western Cartridge.

Meringue Signatures

• • • This is a blanket note of thanks to A. W. Miller, Albert Egger, Robert F. Morley, G. Hermansson, Edgar S. Bowerfind, J. H. Roush, and R. L. Farabaugh for their contributions to our collection of quaint signatures. Their offerings are all unusual and illegible—but the illegibility is due to a desire to save time. This is a natural development—streamlining in the interests of speed, as in the case of the pickerel.

Our interests are more in the angel fish type of signature, where time is no object and on which much loving care is lavished. Example:



Concealed in these curves is the name of C. Norman Dold, Chicago manager of the Rose Exterminator Co., which incidentally does not exterminate roses any more than the Eagle Laundry launders eagles. The Rose Exterminator Co. exterminates rats and insects, and its slogan is, "*We're in Business to Make a Killing.*"

In the Grand Manner

• • • We mentioned recently that what Andy used to call "high class talkin'" requires you to use the word "area" in more than a strictly geographical sense. You now say "In the top income area," or the "4-F area," or the "psychoneurotic area."

Washington's etymological style-setters have also decreed that "atmosphere" and "climate" shall be worn in new ways. Both are now used interchangeably in place of "condition." You do not say "Conditions conducive to adequate employment," but "An atmosphere (or climate) conducive to adequate employment—or over-drinking—or juvenile delinquency."

Jeep's Name-Giver

• • • We had accepted as gospel the story that the jeep came by its name naturally by reason of the fact that the Army's official designation was GP, for "General Purpose." But this is not so, as you may have noticed from a letter in a recent "Dear Editor" page.

Sergeant James T. O'Brien, now at Fort Snelling, Minn., baptized the jeep in 1940 while at Camp Ripley with the 109th Ordnance Co. Suggestions were asked for, and he picked jeep from the cartoon strip, "Popeye the Sailorman," in which there is a long-legged, feathered character known as "Eugene the Jeep," and the name stuck.

Stare Between the Eyes

• • • A member of the business department asks us if we ever heard of a book or booklet called "The Law of Mental Domination." We don't recall it, but if you do you might let us know. But if it is the kind that advocates wearing people down by fixing them with a penetrating stare we hope for his own good he never meets up with it, as we know a fellow who took one of those books seriously; he made people uncomfortable and he came to a bad end.

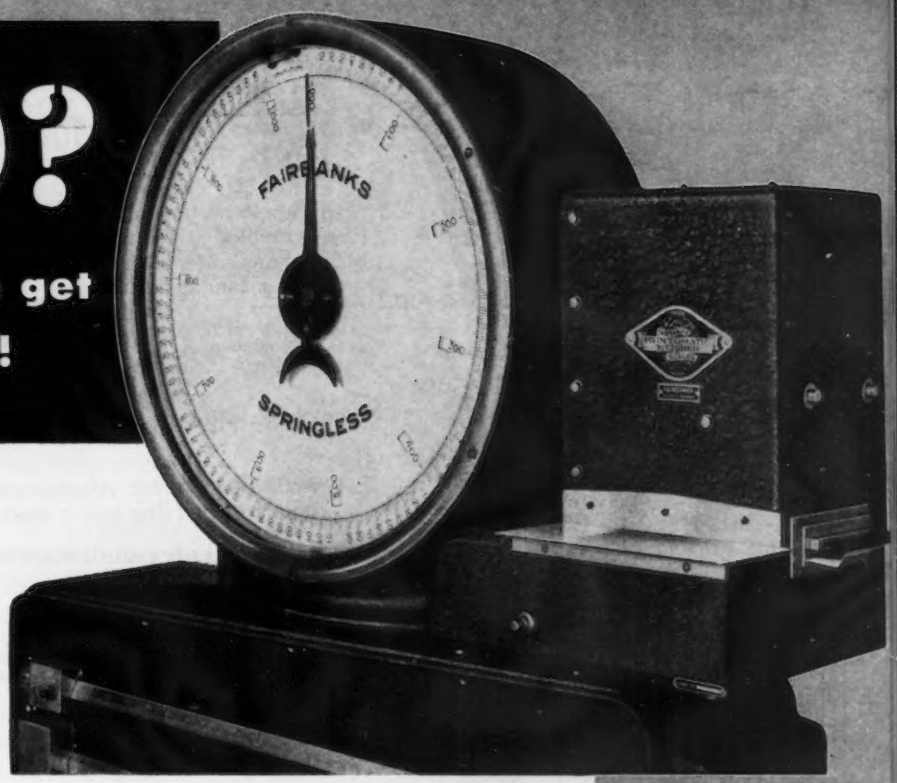
Puzzle

This one is lifted from the Dictaphone Corporation's excellent little house magazine, "It's Said and Done." Par is three minutes:

If a fish's head is 9 in. long and the tail equals the length of the head and one-half the body and the body equals one-half the length of the fish, what is the length of the fish?

GOOD?

They have to be to get where they are!

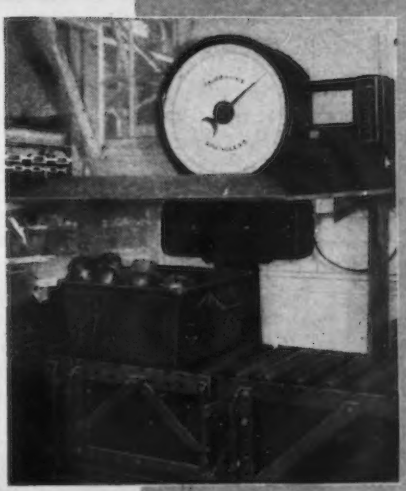


In good light or bad . . . operated by experienced weighmen or novices . . . weighing all kinds of commodities . . . Fairbanks Printomatic Scales have proved to the world that they have what it takes! They eliminate human errors, speed up weighing operations, and provide a PRINTED record showing what was weighed, who weighed it, and when.

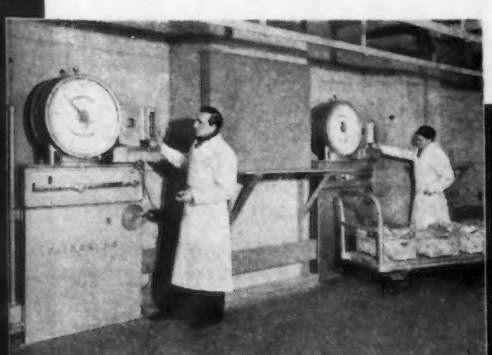
Fairbanks Scales have proved their reliability through their 113 years of service. Each part, carefully designed for its specific function and built with precision, guarantees your incoming, outgoing, and processing weight operations.

The Printomatic records the correct weight automatically, prints it on a roll tape, weigh ticket, or combination of both, or on gummed tickets. Adaptation of Fairbanks Printomatic Scales to weighing problems, simple or complicated, is practically unlimited. Why not investigate what these scales can do for you? Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

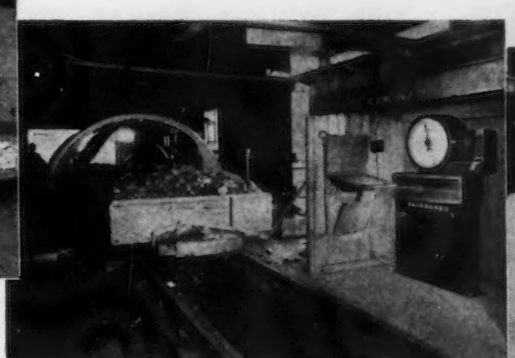
★



Fairbanks Printomatic Conveyor Scale → keeps printed record of piecework in foundry.



↑ Fairbanks Printomatics recording meat shipments to retailers. Each of 221 different kinds of meat is given a designating number.



↑ Fairbanks Coal Mine Car Scale with Printomatic weighs mine cars in motion, protecting employer and miner.

Fairbanks Portable Dial → Scale with Printomatic weighing and printing records of meat to retailers.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
SCALES

WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

FAIRBANKS SCALES

Scales

Dear Editor:

REASON FOR RACE RIOTS

Sir:

In your July 1 editorial, you give the impression that it is a case of white against black in Detroit. I do not know the causes of the trouble in other cities, but you are dead wrong about Detroit.

This negro trouble has been brewing long before the war. This trouble was fostered and fed by politicians, New Dealers and Communists. Four years ago the "National Republican" that source of private information to executives, informed us that the Communists were sending their white women among the negro dance halls to give the negroes a foretaste of Communism in America, or in other words, the negroes were promised privileges with white women. If that is Fascism, I will eat your hat.

The negroes in Detroit before New Deal were as a man Republican. They are now Communists and New Dealers.

The New Deal is trying to force manufacturers here to hire ten per cent black. *Why?*

Resentment and riot against the negro here was the result of a long gathering storm of feeling against the acts of the negroes and the coddling of them by the politician. To wit:

About six years ago negroes go berserk at Put-In-Bay, are driven off the island by the town people.

A terrible, brutal rape and torch killing of two girls and their escorts near Ann Arbor, Mich. The most vicious on record.

More and more attacks on women and young school girls in Detroit, increasing in frequency until the newspapers feared to publish them further.

The monopolizing of our historic Belle Isle by negroes to the exclusion of the whites, also Elizabeth Park. Lately, forceful ejection of whites from their picnic grounds under threat of the ever present razor or knife.

Insults and slashings of whites in the buses and street cars. The ruining of private property by the injection of black housing projects in close proximity or in the midst. (The cause of the Fenlan Avenue riot.)

The refusal of the blacks to use their own special rest rooms in factories and their insistence on using the white man's room.

There you have insults, rape, murder, riot, politics and Communism before the war in Europe. Cheap, dirty politics.

Come to Detroit and ask the negroes themselves who are decent and want to get along and with whom the whites have no quarrel. Further if this political angle is continued, you will find more troubles. Gasoline and matches in the hands of politicians are bound to cause a conflagration.

ARTHUR H. HAPPE,
Strate-Coil Inc.,
6010 Woodward Ave.,
Detroit, Mich.

PIERCING HEAVY STOCK

Sir:

I would like further information on the subject of piercing heavy stainless stock.

EDWARD C. RAFFEL,
Raffel Mfg. Co.,
4528-36 Fullerton Ave.,
Chicago, Ill.

● See the article in the Feb. 20, 1941, Iron Age entitled, "Small Holes Punched in Heavy Stock." The punches described are made by Durable Punch & Die Co., 308 North Loomis St., Chicago.—Ed.

SCREW MACHINE TOLERANCES

Sir:

Can you supply us with any data giving generally accepted standards of tolerance applicable to production of screw machine parts?

W. D. WOOLEY
Elmore Mfg. Co.,
118 Clinton St.,
Elmore, Ohio

● Usually the range of tolerance is set by the screw machine parts buyer rather than by the producer. Where tolerances are not specified by the buyer, we suggest that you refer to the "Tentative American Standard for Tolerances, Allowances and Gages for Metal Fits (B4a-1925)," issued by the American Standards Assn., 29 West 39th St., New York. Incidentally, this tentative standard is now in the process of revision, since it is inadequate under today's conditions and the data contained therein are not as complete as the title would indicate.

For screw thread standards, see the National Bureau of Standards' "Screw Thread Standards for Federal Services, 1942" (Handbook No. H28), obtainable from the Superintendent of Documents, Washington, D. C., for 35c.—Ed.

COLLABORATION WANTED

Sir:

We appreciate the technical contents of THE IRON AGE, most of which find their way into our Data Filing Cabinet, which has proved so useful, supplementing in a most valuable manner the technical text book.

Transport difficulties are hard today, but we are hoping that when the war is over our contacts will be closer and much more numerous. We are trying to foster the same collaborating spirit here as you have in the U.S.A. We tend to work in water tight compartments, but the war is breaking that down. We want to see more collaboration and less competition.

R. WHITFIELD
Incandescent Heat Co., Ltd.,
Birmingham, England

DIE SETTING

Sir:

On your July 15 "Dear Editor" page, J. H. Schaefer asks for information on die setting principles and methods. The "Forging Handbook" by Naujoks and Fabel would be of some assistance. If you can find this book in your library, you will note in the index on page 623 considerable information on dies, die blocks, etc.

R. M. SEABURY,
Secretary-Treasurer
Drop Forging Assn.,
605 Hanna Bldg.,
Cleveland, Ohio

FOOLPROOF GAGING

Sir:

I would appreciate receiving a copy of the article, "Foolproof Gaging System," developed by the United States Army Ordnance.

Your publication is eagerly sought after by all the Office Staff as soon as we receive our copies, and it has always proved a source of interest and information.

H. L. MORGAN,
81 Kemp St.,
Hamilton, N.S.W.,
Australia

BLACK COATING

Sir:

Can you tell me where I can get detailed information about Permyron, the sprayed-on black coating for plain carbon steels, as mentioned in "News Front" of July 1.

G. E. HULSE,
Chief Engineer
Safety Car Heating & Lighting Co., Inc.,
P.O. Box 904,
New Haven, Conn.

Sir:

Your page "News Front" is excellent. I like the idea and read this and the editorial first. . .

One item in "News Front" for July 1 on Permyron coating for steel. Please advise how I can contact manufacturers, as I am interested in this subject.

J. J. LAUDIG,
Research Engineer
Delaware, Lackawanna & Western Railroad Co.,
Scranton, Pa.

● From Oscar Bach Studios, Rockefeller Center, New York, or from Vega Aircraft Research Laboratories, Burbank, Calif.—Ed.

TUBE BENDING

Sir:

You have a very interesting article on pages 54-57 of your June 17 issue on tube bending at the Douglas Aircraft plant. This article is of extreme interest to us. Can you put me in touch with the proper party, who can supply further details?

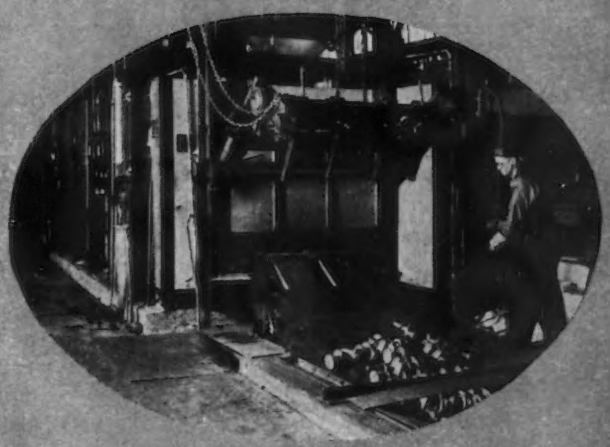
E. J. STONE,
Mfg. Engineer
Westinghouse Elec. & Mfg. Co.,
653 Page Blvd.,
Springfield, Mass.

● Write direct to Douglas Aircraft Co., Santa Monica, Calif.—Ed.

How to guard against a waste of time in checking forgings for uniformity

Strict adherence to a prescribed procedure for heat treating forgings produces the desired specified results. Therefore, it is not unusual to check ten and pass ten, when checking T & W Forgings for uniformity of physical structure. Repetition of this experience leads to confidence in the merit of T & W Forgings and this in turn permits a reduction in your checking detail, avoids delays and cuts your expense in checking to a minimum. Nothing less than strict adherence to an exact procedure in heat treating can effectually guard against a waste of forgings or a waste of time in checking and in finishing them. And, there is no substitute for experience in heat treating forgings. Heat treating T & W Forgings is a straight forward production process conducted under the direct supervision of the T & W chief metallurgist whose task is to obtain uniformity in the exact degree desired.

Only experience and confidence are safe guides in determining when to check one and pass nine forgings—or when to check all ten forgings.



Utilizing every modern device for heat treating, and precision instruments to control every operation, T & W heat treaters, qualified by years of experience, obtain exact results in terms of hardness, toughness, ductility and other physical properties with such regularity and certainty that a loss of either forgings or time seldom occurs.

FORGINGS

USUALLY COST LESS
at the Point of Assembly

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION • ALLIANCE, O.

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, INDIANAPOLIS, DETROIT AND CLEVELAND

This Industrial Week . . .

- ***New Military Supply Projects Revealed***
- ***Campaign for Steel at 820,000-Ton Mark***
- ***Low Civilian Inventories Worry Washington***
- ***Steel Ingot Rate Rises by One-Half Point***

AS United States military forces this week pushed their new programs for offensive weapons, the national ingot production rate moved up one-half a point, the "Share the Steel" campaign achieved large new gains, and there were indications that the battered civilian economy now a source of concern in Washington might be favored with some additional steel.

Topping the recent military supply projects mentioned a week ago, steel sellers this week were excited by reports concerning a vastly enlarged program for steel landing field mats. Orders for steel piling were on the increase. Further evidence bearing upon demand for steel plates came out with the Roosevelt statement that the shipbuilding program will be larger next year than this year. Airplane makers, faced with the new WPB goal of 10,000 ships per month before the end of this year, will require larger amounts of alloy steel than ever.

The latest programs, plus the tendency of war goods makers to place orders for steel as far ahead as possible, have loaded mill books far into the future. Aside from orders that might be placed where cancellations occur, there are now no openings on the books of some mills for the remainder of this year and schedules for the first quarter of next year are filling at a fast rate. The critical situation that existed on alloy bars some weeks ago is reported pretty well cleaned up, but carbon steel bars have taken this critical spot.

MEANWHILE, the WPB drive to put steel to use from inventories met with results above expectations. One forge shop alone was reported to have released 8000 tons of steel bars while another cancelled the equivalent of three months' supply of steel.

Recovery of about 820,000 tons of steel through cancellations of allotments in the third and fourth quarters was reported on Tuesday at Washington. This total exceeded official hopes expressed last week that the drive would net around 650,000 tons. Actually, recovery from inventories may go higher.

The cancelled allotments are divided 80 per cent in the third quarter and 20 per cent in the fourth quarter. About 75 per cent of the total is carbon steel with the remainder being alloy steel.

John Q. Public for some time has been peeved at having his patriotism questioned every time he seeks a hoe, a stew pot or a bunch of safety pins, and Washington finally is waking up to this fact. It is predicted in some quarters that improved inventories of civilian goods by the end of this year are a distinct possibility and that by mid-1944 many essential demands probably will have been filled.

The fact that the Truman Committee has been investigating Army purchases may be reflected in the present willingness to relax slightly in favor of the civilian economy. Other factors are believed to include the imminence of elections; the recent request of James F. Byrnes for a list of needed consumer goods; the letter of A. D. Whiteside of WPB on the subject of civilian requirements, and the OCR request for 140,000 tons of steel in the fourth quarter of this year. WPB knows that it has allowed civilian goods to reach a dangerously low point. One improvement aiding civilians somewhat has been the recent rebuilding of warehouse stocks, which are now closer to normal than they have been for months. WPB has taken action to build up the civilian supply of parts for furnaces, stoves, ranges and water heaters.

ADJUSTMENT of war goods contracts continues. Indications now are that the ammunition program is moving toward more consistent stabilization. Large cutbacks were spread through the entire munitions list during the past several months, but some of the current, comparatively low production quantities are being enlarged, indicating that the services are bringing their requirements into the best balance of the war to date.

An interesting development turned up in late July at steel mills, which received form letters from WPB notifying them of preferred positions on order books within specific programs. Mills were given the relative order in which production was wanted on steel for the synthetic rubber and high octane gasoline programs when more than one booking in either field was on company schedules for any month. It was said this definitely does not constitute any return of importance to a priorities system of scheduling. It means simply that when a mill has two or more bookings for the particular programs mentioned, the relative order of production and shipment is set up for those bookings alone. These rankings apply solely within the program; they do not displace or affect bookings for other claimant agencies.

If the lower ranking of any orders on hand for any one month cannot be completed in that month, it will be carried over the same as usual.

Steel men are deriving little comfort from their operating cost sheets. Production expense has been

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rising steadily during the past two years, while rigid price ceilings have continued unchanged on finished goods.

To considerable extent, increased production costs stem not alone from higher wage rates, but from reduced efficiency of new employees as well.

WITH the advent of the 48-hr. week in the steel industry, much complaint was being voiced over arbitrary and inconsistent rulings by district WMC officials, with little agreement between rulings in different areas...In the Cleveland area, meanwhile, WMC was worried about reports that miscellaneous manufacturers were keeping employees on the payrolls in spite of the fact there was not enough work to utilize them...Production directives are expected under CMP governing tin mill primes and seconds...It now appears there will be no radical revision of the Class B list under CMP.

The new goal for iron ore shipments upon the Great Lakes this season is 86,500,000 tons, instead of 91,000,000...A drastic change on a vital food product—that is the way canners size up the recent amendment of Order M-81, which makes mandatory the use of 0.75-lb. electrolytic tin plate after Sept. 30 for the making of condensed milk cans. Problems resolve around obtaining a good bond between the solder and the new plate. Eventually it can be accomplished but perhaps not as rapidly as the WPB thinks...In the East, it is reported that some steel still is escaping through the illegal use of allotment numbers, probably by the same firms and individuals who ignored regulations under the old preference rating system, and succeeded in getting away with it...Aluminum, expected to show a 500 per cent increase this year in production contrasted with 1929, will not replace much steel on a tonnage basis, but the big fight will develop against stainless and alloy steels, with the determining factor being the price situation...At the start of 1943 it was estimated about 25,000 small size diamond dies would be needed in the U. S., and the outlook was dismal. But mass production methods were achieved with a special machine which can drill eight to 12 dies at one time and the bottleneck has been broken.

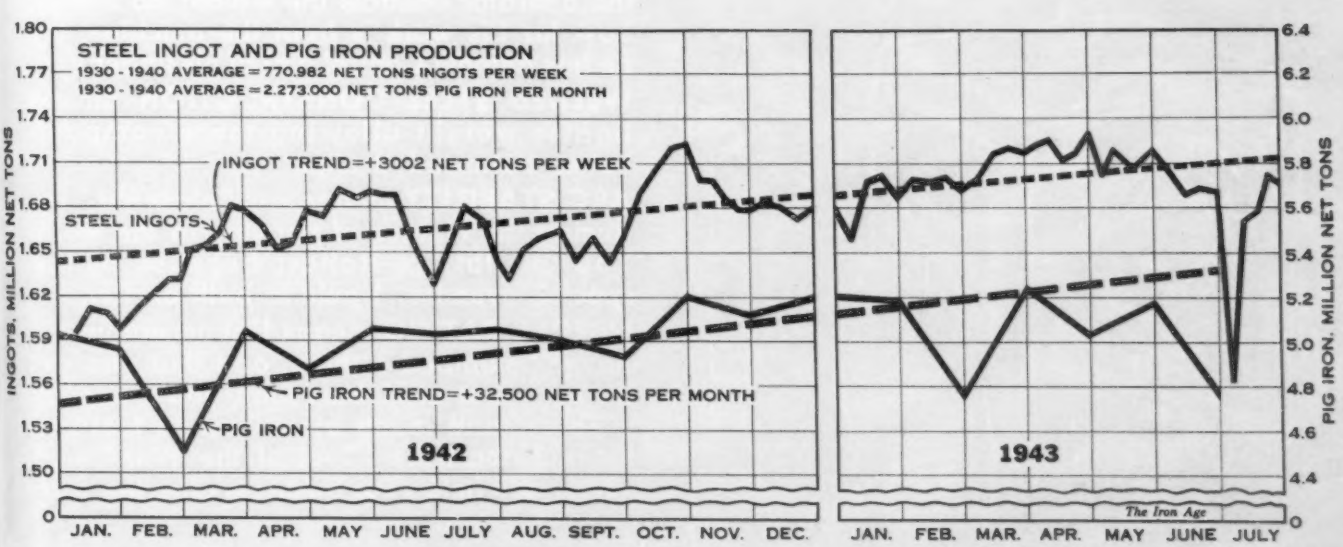
The steel ingot rate moved up half a point from last week's 98, with Pittsburgh, Youngstown, and Philadelphia districts each up one point, Southern Ohio River up 12 points to 107, Chicago down a point, Buffalo down two points, St. Louis down 10 points to 99 and Eastern down 10 to 101. Detroit was down a point from last week's revised figure of 100 and Cleveland, Wheeling, Southern and Western districts remained unchanged.

Flexible Pipelines Supply U. S. Fighters

New York

• • • Lightweight flexible pipelines of spiral wound steel, which may be laid fast by unskilled or regular Army personnel, are reported to have played a big part in supplying gasoline for the U. S. forces in Sicily. Of both 4 in. and 6 in. sizes, the sections are 20 ft. long. The lines resist bomb shocks because of their flexibility. S. S. Smith of Shell Oil Co. was credited by his company for developing the portable pipe line.

The Iron Age



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
July 29	101.0	98.5	97.0	93.0	100.0	106.5	88.0	98.5	*100.0	102.0	95.0	109.5	111.1	98.0
Aug. 5	102.0	97.5	98.0	94.0	100.0	104.5	88.0	98.5	99.0	102.0	107.0	99.0	101.0	98.5

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Steep Boost Asked of Plane Industry; U. S. Output Already Far Exceeds Axis

o o o

EXTRA BOMBS: The fork-like fingers on the bottom of the Flying Fortress fuselage are new external bomb racks which boost carrying capacity to 10 tons.

• • • **Thirty-four years ago** last Sunday the Army bought its first frail airplane, a machine capable of flying at 32 miles an hour. In the 18 months ending July 1, 1943, the Army had accepted 73,132 planes and today United States aircraft production is averaging around 7000 planes per month, with the Army receiving about 4500 of the ships.

This description by the Army of the sensational growth of the aircraft industry was one of numerous statements covering war goods production issued during the past week. Donald M. Nelson, head of WPB, reported that aggregate war output is still rising, but the rate of climb has lessened.

Against the U.S. plane production figure, the Army estimated that total Axis production is not more than 4000 planes per month, with Germany producing 2200 and Japan 1200. It was pointed out that in the last war the Army spent $503,000,000 for planes, engines and parts, while in the present war up to June 30 this year, allotments to the Army Air Forces totaled $40,000,000,000, all of which had been obligated.

Ten thousand planes a month before the end of the year was the goal set by Nelson in one radio address Monday, Aug. 2. Charles E. Wilson in another speech declared that by early next year we must be turning out 40 per cent more combat munitions than at present, even though the work force in the munitions industries can be increased only 10 to 15 per cent.

Meanwhile, this week, a conservation directive issued by the Operating Committee on Aircraft Materials Conservation stated that corrosion resisting steel conforming to specifications AN-QQ-S-757,771,772 and AN-QQ-W-423 can only be used in the following applications in airframes and airplane engines: All parts of the exhaust system which come in contact with exhaust gases and which are exposed to high temperatures; supercharger system; vital engine or engine accessory parts exposed to temperatures in excess of 800-deg. F. during fabrication or service, which during service are subjected to severe corrosive or fatigue failure conditions; hinges and hinge pins; welding rods and electrodes used in welding the above material.

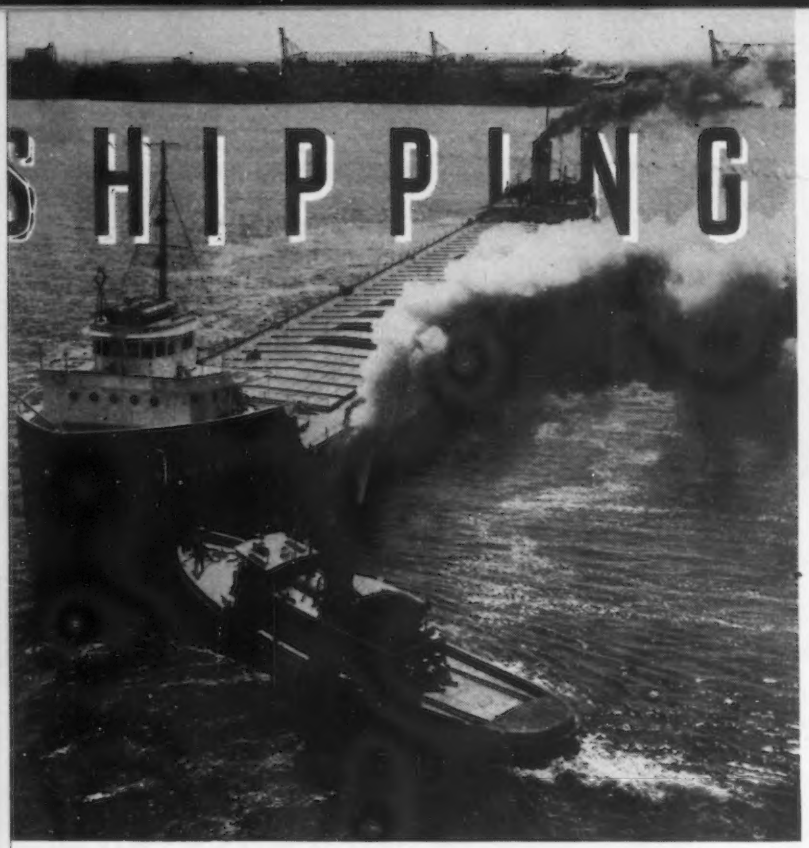
The action was forced by the shortage of columbium and the impracticability of complete conversion to titanium; and the shortage of molybdenum.

Mr. Nelson's report stated that at the end of June 43 per cent of the total volume of munitions requirements currently scheduled for 1943 actually had been produced. Average monthly output in the next six months must be 30 per cent higher than in the first six months of this year, he said.

Broken down by classes of material, June production showed the following variations from May production: Aircraft production increased 3 per cent; self-propelled artillery decreased 13 per cent; combat vehicle production increased 2 per cent; artillery (excluding self-propelled) decreased 7 per cent; small arms and infantry weapons increased 14 per cent; naval vessels (value put in place) decreased 3 per cent; merchant vessels (value put in place) increased 11 per cent; miscellaneous munitions increased 1 per cent.

Net orders for machine tools, new orders less cancellations, declined in June to $38,322,000, a 21 per cent decrease from the May total of $48,241,000 (revised). Shipments amounted to $108,689,000 in June, a drop of 5 per cent from the May total of $113,859 (revised). The accumulated backlog of unfilled machine tool orders was $511,478,000 at the end of June.

Government-financed war construction completed in June was estimated at $1,010,000,000, off 4 per cent from the revised May total. Expansion of industrial facilities, which includes construction of plants and deliveries of machinery and equipment, declined 8 per cent in June to $414,000,000 (estimated) from the May total.



HELPING TO MOVE ORE: This Great Lakes steamship is a vital factor in the lifeline of the American steel industry.

Lifeline Of Steel Industry Is Nearing Peak of Its Strength; New Vessels Are Being Added Steadily

Cleveland

• • • **Great Lakes** shipping, which forms the lifeline of the American steel industry, has the foresight of the U. S. Maritime Commission and the energies of two lake shipbuilders to thank for permitting an ever-increasing flow of traffic over these important waterways during the past year. Furthermore, that flow of traffic gradually will increase, because almost at the rate of three a month new vessels are coming into the ore trade and easing the shipping situation.

Deliveries of these new 620-ft. ships have been regular since the opening of the ore season, and to date there are about eight turned over to the operators, the last two being delivered in recent weeks.

Two builders have participated in the construction of these boats, the American Ship Building Co., building two boats at its Cleveland and four at its Lorain, Ohio, yards, and the Great Lakes Engineering Co., building six vessels at River Rouge, Mich., and four at Ashtabula, Ohio. Great Lakes has delivered four of ten of these vessels it built, while American Ship Building has delivered four of the six vessels, all of which have been launched. There will likely be 14 of the 16 scheduled boats in the ore trade by the end of the season.

The significance of the annexation of these 14 boats to the ore trade cannot be taken too lightly. With the ore season opening about a month later than the normal commencement of lake navigation and with the quota for ore set by WPB at 91,000,000 gross tons, the aid of these boats will probably swing the balance in this work. There has been and is considerable doubt that the desired tonnage could be shipped this year, and many factors aside from the weather are working against the problem. Where normally as many as 35 or 40 Canadian ships have engaged in American ore trade, this year there have been only eight. Canadian boats have been busy in the grain movement. In the July report on American Great Lakes ore vessels, issued by the M. A. Hanna Co., for the first time this year 100 per cent of the boats available for ore transport has been in that trade, some of the smaller vessels having previously been carrying grain. There are now 308 boats in the ore service, whereas as late as June 15 there were only 292.

The new Maritime Commission-built vessels coming into service will

Builders, Operators, and Delivery Schedules

Vessel	Builder	Operator	Delivery
Thomas Wilson, Jr.	American Ship Building Co.	Wilson Transit Co.	May
Richard J. Reiss	Great Lakes Engineering Co.	Reiss Steamship Co.	May
Sewell Avery	American Ship Building Co.	Pittsburgh Steamship Co.	May
Frank Armstrong	Great Lakes Engineering Co.	Interlake Steamship Co.	May
Champlain	American Ship Building Co.	Cleveland-Cliffs Iron Co.	June
Cadillac	Great Lakes Engineering Co.	Cleveland-Cliffs Iron Co.	June
Clarence B. Randall	Great Lakes Engineering Co.	Pioneer Steamship Co.	July
George A. Sloane	Great Lakes Engineering Co.	Pittsburgh Steamship Co.	July
John Hutchinson	American Ship Building Co.	Buckeye Steamship Co.	July
J. Burton Ayers	Great Lakes Engineering Co.	Great Lakes Steamship Co.	August
Frank Purnell	Great Lakes Engineering Co.	Interlake Steamship Co.	August
Eugene G. Grace	American Ship Building Co.	Interlake Steamship Co.	Aug.-Sept.
J. H. Hillman, Jr.	Great Lakes Engineering Co.	Great Lakes Steamship Co.	
Robert C. Stanley	Great Lakes Engineering Co.	Pittsburgh Steamship Co.	

Remaining two boats to be built by Great Lakes Engineering Co., but have not yet been named or assigned.

be fully utilized, a condition for vessels of like capacity that has never before been possible. The new MacArthur locks in the St. Mary's River at Sault Ste. Marie permit passage of these vessels as well as the last five added to the Pittsburgh Steamship Co. fleet late in 1942, to negotiate the trip down lake fully loaded to about 17,000 tons. The locks, capable of handling ships with drafts up to 30 ft., will easily handle these 25-ft. draft vessels. There was a period of about three weeks this year when these boats could travel fully loaded before the MacArthur locks were opened, but that was because of the record high level of the water.

To say that the ore fleet will make its goal of 91,000,000 tons this year might be a bit on the optimistic side, but with a decent break in the weather at the close of the season, stretching shipping for an extra week or ten days after Dec. 5, it is within the realm of possibility. The new boats added to the fleet will swing the odds in favor of the shippers, if possible.

•

• • • **The steamer** *Clarence B. Randall* arrived at Inland Steel Co.'s Indiana Harbor plant July 24 on her maiden trip with a 15,000-ton cargo of iron ore from the Marquette Range in Michigan, becoming a regular member of the group of lake carriers transporting ore to lower lake ports.

The vessel, owned by the Pioneer Steamship Co. of Cleveland and named for the vice-president of Inland Steel, was launched a few months ago at Ashtabula, Ohio. Her captain is H. J. Scheible.

Ore Shipping Goal Reduced Again

Washington

• • • By agreement between the Great Lakes Carrier Association, WPB and ODT, the iron ore shipping goal on the Great Lakes for this season has been lowered from 91,000,000 to 86,500,000 tons. The directive under which this was done was issued July 26 and "takes into consideration the realities of the situation." A late season opening, heavy fogs and collisions are among the factors.

A WPB spokesman says that the loss of approximately 7,000,000 tons, off from the 93,000,000 tons shipped last year, means that the tonnages at blast furnaces next spring, if the lakes are as late in opening as they were this year, will be a 30-day supply instead of the 100-day supply which was on hand when the first 1943 shipments were made.

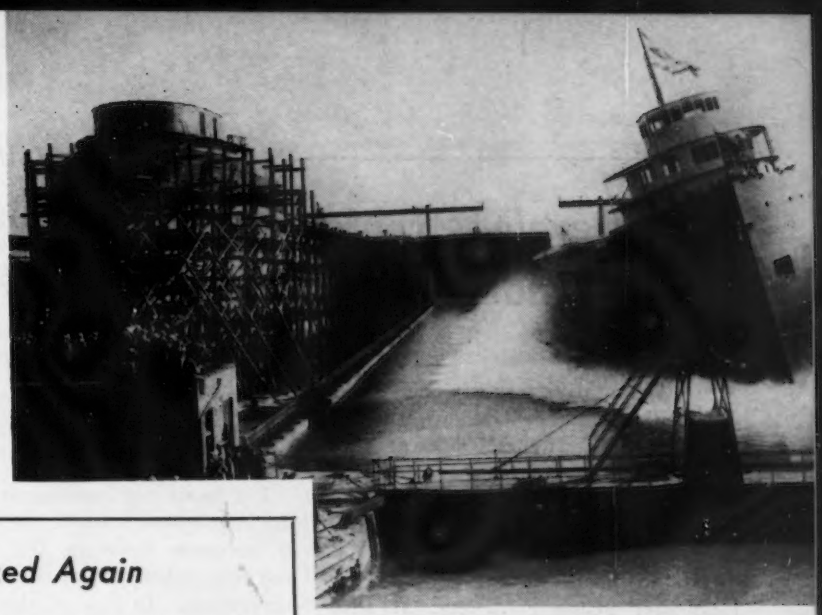
Blast furnace and ore dock stocks on July 1 amounted to approximately 27,000,0000 tons. All-rail shipments from the upper lake regions will amount to about 1,800,0000 tons.

Bethlehem Builds New Ocean Fleet

New York

• • • Because most of its ocean fleet of ore vessels has been lost in the war, Bethlehem Steel Co. is building a series of eight new carriers, each with 25,000 tons' capacity, and capable of traveling at 16 knots per hour. It is hoped by the company that the ships will be ready promptly at the end of the war. The designing has been completed and the carriers are being constructed, according to E. G. Grace, president of Bethlehem, who explained that only three vessels remain out of eight of 20,000 tons' capacity each, owned or chartered by the company prior to the war. The old type vessels were capable of about 8 or 10 knots per hour.

At present Bethlehem is receiving no ore from Chile, although two-thirds of the mine forces there still are employed digging and piling ore. Development of the new Venezuela mines is being hastened but first ore probably won't be shipped until late 1944 at the earliest.



THREE A MONTH: New vessels for the transportation of ore are launched at the rate of three a month. U. S. Steel Corp. photo.

o o o

Pointing out that shipments of coal by the Great Lakes have fallen 4,000,000 tons below those of last season, Solid Fuels Administrator Harold L. Ickes has urged producers and forwarders to fill their lake coal orders before those of well-protected industrial consumers receiving coal by all-rail. The sharp drop in lake shipments is due to late opening of navigation and strikes. Mr. Ickes said that it will be necessary to utilize all of the lake transportation facilities that can be made available if the lake coal docks are to be supplied before the close of navigation. This was declared to be particularly true of the docks on Lake Superior and upper Lake Michigan.

Administrator Ickes said that total lake coal shipments to United States ports this year, as of July 1, were 10,882,908 tons. Last year 14,304,215 tons had been hauled by lake carriers as of that date.

o o o

UNLOADING: The Leon Fraser, one of the Pittsburgh Steamship Co.'s vessels, unloads its cargo at Conneaut Lake.

WPB Develops Tentative Regulation For Termination of Halted War Contracts

New York

• • • **A tentative regulation** by the WPB Procurement Policy Division covering the settlement of war contracts is being sent to interested parties for comment and possible revision before issuance. It is fundamentally a uniform termination clause and defines the basis of termination for lump-sum prime contracts. It also facilitates termination of sub-contracts up to $10,000 with speed.

In permitting news of the regulation to leak out, the division has made clear that the order has not yet been issued and will not be until further comment and suggestions have been incorporated within it. The letter accompanying initial drafts of the regulation, sent out for comment, specifically asks an opinion on the desirability of contract termination insertions to be used in lump-sum supply contracts in a choice between those used by War Department, Navy, Maritime Commission, Treasury and their own.

To expedite settlement of sub-contracts the proposed regulation would permit claims up to $10,000 to be settled between the sub-contractor and the contractor without approval of the contracting officer. Also lending speed and simplicity to the plan, the contracting officer may delegate authority to the contractor, which may be passed along to the sub-contractor, to sell materials, supplies and facilities which were acquired for the contract, the proceeds to be credited in settlement.

The basis for compensation set by the regulation permits the settlement of accounts between the contractor and contracting officer through mutual agreement. In lieu of this a simplified formula is provided which eliminates haranguing and allocation of costs between the completed and uncompleted portions of the contract. The formula provides payment for the completed part of the contract at contract price and payment of the costs incurred for the uncompleted part of the contract plus four per cent for profit.

Actual payment of the claims of both contractors and sub-contractors has been simplified and put on a reverse basis to the way CMP allotments are extended. In other words, the sub-contractor places his claim for payment with the prime contractor and the prime contractor in turn confronts the contracting officer with both his own claims and those of his sub-contractors.

Claims are permitted for what is termed a "basic amount" which constitute an amount not greater than the total cost of the contract less continued work; or a previously agreed amount of compensation; an amount established by the formula mentioned above or established under other limiting provisions of the regulation. Claims are to be supported by a schedule of costs and the recipient is asked to furnish bond covering an amount which may later be found to represent overpayment. The supporting schedules of costs are certified. Sub-contractors' practices are similar except that the request for payment is made to the prime contractor.

Actual payment of claims is placed with the contracting officer who is authorized to make payment on certified schedules of costs as limited by the regulation without investigation of schedules. Prime contractors are the recipients for both their own payments and those of their sub-contractors. The sub-contractor must look to his prime contractor through which he made claim for payment.

The contracting officer may require evidence of the prime or sub-contractor to substantiate claims for payment, but once this officer has evidenced satisfaction (in the absence of deceit or fraud) such is final in the negotiation between the government and the claimant. However, the head of the contracting officer's department may request additional evidence in specific cases prior to payment.

In the event of disputes arising out of negotiation of contract terminations the contracting officer's decisions are considered final pending appeal if the claimant feels that an injustice is being done. These disputes may

Production of High Strength, Heat Treated Aluminum Castings

Source: WPB, monthly reports filed by 1000 foundries

Month	Total Castings	SAND CASTINGS				PERMANENT MOLD CASTINGS			DIE CASTING		
		Total	Cylinder Heads	Other Heat-Treated	Non Heat-Treated	Total	Heat-Treated	Non Heat-Treated	Total	Cold Chamber	Gooseneck
1942—January	19,953	12,460	*	8,129	4,331	3,899	3,583	316	3,594	NA	NA
February	19,711	11,883	*	7,828	4,055	3,863	3,557	306	3,985	NA	NA
March	23,275	13,729	*	9,145	4,584	4,385	4,016	369	5,161	NA	NA
April	24,864	15,227	*	10,393	4,834	4,483	4,041	442	5,154	NA	NA
May	24,010	15,612	*	10,940	4,672	4,429	3,909	520	3,969	NA	NA
June	25,425	16,525	*	11,728	4,797	4,768	4,148	620	4,132	NA	NA
July	26,943	17,887	4,730	8,207	5,260	4,545	4,070	475	4,511	NA	NA
August	29,100	19,302	5,993	7,987	5,102	5,052	4,604	448	4,746	NA	NA
September	30,625	19,715	6,349	8,518	4,848	5,994	5,432	562	4,916	NA	NA
October	33,764	21,830	7,357	9,062	5,411	6,480	5,841	639	5,454	4,418	1,036
November	32,354	21,130	7,465	8,907	4,758	6,286	5,713	573	4,938	4,049	889
December	34,051	22,188	8,403	9,074	4,711	6,479	5,865	614	5,384	4,473	911
1942—Total	324,075	207,488	NA	150,125**	57,363	60,663	54,779	5,884	55,924	NA	NA
1943—January	33,084	21,875	8,875	9,032	3,968	6,406	5,808	598	4,803	4,036	767
February	33,502	22,162	9,039	9,111	4,012	6,516	5,950	566	4,824	3,944	880
March	38,735	25,309	10,974	9,997	4,338	7,949	7,268	680	5,477	4,519	958
April	37,065	24,296	9,963	9,973	4,360	7,586	6,919	667	5,183	4,301	882
May	37,815	25,104	10,548	10,032	4,524	7,667	6,988	679	5,044	4,157	887

NA—Not available.
*—Separate data for cylinder heads not available; included under "Other heat-treated sand castings."
**—Total, all heat-treated sand castings, including cylinder heads.

be settled with the contracting officer or appealed to a special board within 30 days after receipt of the contracting officer's decision. Appeal boards for this purpose are to be established in each department issuing contracts and consisting of a chairman and two members of the department who may be employees of the department but known to be impartial. Procedure for entering such appeals has not yet been established.

Restrictions have been placed upon termination of contracts. The government is permitted under the regulation to terminate contracts only in accordance with the regulation, as a result of default by the contractor, or in accordance with a statute providing termination.

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Washington

• • • **When the House Naval Affairs** Committee recently investigated the renegotiation of war contracts, Carman G. Blough, coordinating officer of WPB who has attended the renegotiation proceedings of all Price Adjustment Boards, pointed out five main criticisms of the renegotiation law and expressed an opinion on them. The five most general criticisms were: (1) excess profits should be related to profits after taxes instead of before; (2) business in standard commercial products should be exempt from renegotiation; (3) renegotiation tends to destroy a manufacturer's incentive to lower production costs; (4) no formula exists for equitable renegotiation for all firms; (5) post-war reserves are given no recognition in the renegotiation proceedings.

Emphasizing that each manufacturer represents an individual problem for the post-war period, Mr. Blough states that it has been impossible so far to uniformly estimate what post-war reserve will be equitable throughout industry. Consequently, the 10 per cent post-war refund permitted on excess profits taxes is believed by Mr. Blough to be the most accessible answer.

After asserting that he is not opposed to post-war reserves, he went on to say: "Assuredly manufacturers should be fairly compensated for their contribution to the war effort, and, as far as possible, for the risks they have taken to make those contributions. Beyond that they have a right to expect a reasonable degree of freedom of action after the war to exercise their several abilities to prosper in the American Way.

'Dynamic Expansionary Economy' Will Be Formed in U. S., Report Reveals

Washington

The "Little National Resources Planning Board Report" on demobilization, endorsed by the President last Friday, is regarded as a precis of the bulkier report issued earlier in the year by the NRPB. Because Congress did not like it, the board is now in the process of liquidation.

Aside from the fact that the report recommends soldier benefits from the government, all provided after the last war, the report says the government intends to establish a "dynamic expansionary economy."

The "dynamic expansionary economy" involves the government in every phase of personal, financial, and social aspect in the life of the individual. The government wants to retain for the "period of readjustment" all controls over manpower, materials, and prices granted by Congress for the duration until the transition to peace is accomplished.

Euphemistically, all this may add up to "dynamic expansionary economy" to its proponents, but generally such control is more simply defined as "state socialism." The danger that the period of transition to peace will never end is made real by the fact that the present administration never rose from the "emergency of peace" during its entire tenure.

Names of the dozen-man informal conference who are responsible for this document, follow:

Dr. Floyd W. Reeves, NRPB Chairman; Dr. Francis J. Brown, Education Adviser, Joint Army-Navy Committee on Welware and Recreation; Dr. Edward E. Elliott, Chief, WMC Professional and Technical Employment and Training Division; Dr. William Haber, Director, WMC Bureau of Program Requirements; Brig. Gen. Frank T. Hines, VA Administrator; Maj. Gen. Lewis B. Hershey, WMC Director, Bureau of Selective Service; Dr. A. F. Hindrichs, Labor Department Acting Commissioner of Labor Statistics; Lt. Comdr. Ralph A. Sentman, U. S. N. Navy Department Officer in Charge of Educational Services Section, Training Division, Bureau of Navy Personnel; Col. Francis T. Spaulding, War Department Special Service Division; Howard R. Tolley, Chief Agriculture Department's Bureau of Agriculture Economics; Dr. Thomas J. Woofter, FSA Director of Research; Leonard Outhwaite, NRPB Secretary.

NRPB wants to put the plan into operation "now." Its announced policy is that fighting men "must not be put in the position of rescuing the world from the grasp of aggression only to return to a world in which they cannot find their place and their opportunity."

While the report gives lip-service to private enterprise, its overtones imply that once government acquires the rudimentary knowledge of how to run business, it will never give up its hold. Business acceptance of NRPB's proposal is sought by the lagniappe of continuation of war contracts, modified war production and easy contract cancellation.

The report says it is the job of the government to provide the general leadership for the transition period.

•

• • • **Private industry** is prepared to accept the nomination as the source of post-war jobs, said F. C. Crawford, president of the National Association of Manufacturers, on Monday of this week. The first necessary step, however, is to make it possible for industry to accumulate reserves for use in the post-war period, said Crawford.

Overlapping Audits Are Ended

Washington

• • • Designed to save war contractors delay and trouble and to save the government the expense of avoidable duplication, the War and Navy Departments have inaugurated a program to eliminate overlapping audit functions wherever possible. Under the new plan, the agency having the predominant interest in any contractor's work will act for both. It was pointed out that there is no substantial difference in the cost accounting methods of the two departments. As a result, it was said, it has already been possible to consolidate their auditing activities in the plants of several contractors engaged in work under cost-plus-a-fixed-fee contracts. It was stated that one of the activities which has benefited particularly from the existence of Army-Navy audit coordination committees, which have been created in each industrial district, is the field of audit of time and material subcontracts under this type of contract.

Bethlehem's Billings Show Huge Gain

New York

• • • **Despite** a huge increase in net billings, only a small gain in profits is shown by the latest financial report of Bethlehem Steel Corp.

Second quarter net income was $6,614,210 against $6,228,693 in first quarter and $6,070,913 in second quarter of 1942. Net billings were $490,414,380 in the most recent quarter vs. $432,715,168 in first quarter and $360,118,243 in second quarter of 1942.

Total payroll for the latest quarter was $220,987,000, representing pay to 291,488 persons. In the first quarter the payroll was $199,457,000 to 275,569 persons. Average earnings per hour were $1.288 in the second period of 1943 vs. $1.279 in first quarter. E. G. Grace, president, said Bethlehem coal miners averaged $1.365 in May for 34.6 hr. per week.

Overtime pay in the second quarter was $25,145,000, or 11.5 per cent of the total payroll.

Mr. Grace said his shipbuilding divisions now are having difficulty getting workers and need 15,000 more. Other points he expounded upon included:

Strikes—"Intolerable and unnecessary because we have in all union contracts clauses which cover the handling of disputes." He asserted, "Practically all work stoppages stem from union representatives."

Critical Alloys — Supplies are greatly improved.

Steel Industry Expansion—Industry is overbuilt for its peace-time job.

Shipbuilding—Company's ship-per-day program is on schedule.

New C-I Electric Furnace in Operation

• • • **Adding 65,000 tons annually to the nation's capacity for the production of aircraft steels, a new electric furnace has been placed in operation at the South Chicago Works of Carnegie - Illinois Steel Corp. Addition of this unit brings to six the number now in operation in the plant's electric furnace department, which has been for many years U. S. Steel's principal producer of electric furnace steels.**

The new furnace, designed and installed by American Bridge Co., is now in full production, turning out 70 tons per heat of steel. Installation was begun in October, 1942, and completed early in July.

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Olds Sees Cost Savings at War's End

New York

• • • **Opportunities** for a downward adjustment of steel company costs after the war ends were cited by Irving S. Olds, chairman of U. S. Steel Corp., last week after he issued earnings of the corporation as reported in last week's issue, page 66.

The huge sums involved in overtime pay (which has been rising steadily) will be unnecessary, he said. Marginal plants can be closed, including beehive ovens.

Highlights of Mr. Olds' other remarks include:

Renegotiation—Status about same as three months ago, pretty much in preliminary stage.

Coal Strike Losses—272,000 tons of pig iron lost due to furnace shutdowns plus inroads upon inventories. 72,000 tons of ingots lost, perhaps more if a true estimate could somehow be attained. Also, 90,000 tons of scrap was used, depleting stockpiles. Loss of valuable by-products unestimated.

Unexpended Government Balance for New Facilities—About $161,000,000 out of $440,000,000.

Ingot Capacity of U. S. Steel—31,330,700 net tons as of July 1.

Ingot Yield in Finished Products—70 per cent now vs. 74 per cent a year ago.

Women Employees—34,000, or 10 per cent of total employment. Thirty per cent are salaried.

Recent Second Quarter Income Reports

Company	1943 2nd Quarter	1943 1st Quarter	1943 Half Year	1942 Half Year
U. S. Steel Corp.	$15,679,456	$15,406,597	$31,086,053	$33,866,907
Bethlehem Steel Corp.	6,614,210	6,228,693	12,842,903	12,211,601
Inland Steel Co.	3,011,333	2,796,321	5,807,654	4,895,481
Jones & Laughlin Steel Corp.	2,411,248	2,399,369	4,810,617	4,930,470
Republic Steel Corp.	2,337,175	3,666,557	6,003,732	8,072,120
Youngstown Sheet & Tube Co.	2,257,424	2,147,023	4,404,447	4,867,716
Crucible Steel Co. of America	——	——	3,714,069	3,846,775
Wheeling Steel Corp.	1,329,010	961,391	2,290,401	1,995,648
Sharon Steel Corp.	489,871	445,564	935,436	637,202
Pittsburgh Steel Co.	420,000	600,121	1,020,121	1,377,175
Copperweld Steel Co.	——	——	444,141	597,868
Granite City Steel Co.	——	——	221,912	254,490
Keystone Steel & Wire Co.	——	——	1,092,143*	1,796,032
American Rolling Mill Co.	——	——	3,229,697	——

*Report for fiscal year.

WPB and WMC Cooperation Saves 18,000 Tons of Pig Iron

Detroit

• • • **WPB and WMC** last week joined forces to prevent the loss of 18,000 tons of pig iron at the Great Lakes Steel Corp. The company had taken a blast furnace out for relining and enlarging. The contractor on the job could not round up enough experienced bricklayers. Clinton Golden of WPB put the problem up to the International Bricklayers Union who managed to round up sufficient men.

Steel Division Transferred

• • • **Executive** Vice Chairman Charles E. Wilson of WPB has just signed a general administrative order transferring the Steel Division to the Office of Operations Vice Chairman, H. G. Batcheller. The director of the Steel Division is instructed to report to and be responsible to Batcheller. The Steel Division heretofore has been under the direct supervision of Wilson. It is reported that the copper and the aluminum divisions will also be transferred to Batcheller. They are as yet under the supervision of Wilson direct. See chart of steel division on opposite page.

WAR PRODUCTION BOARD
STEEL DIVISION

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B. F. Fairless — Heyward Niedringhaus
Frank R. Frost — Frank Purnell
E. G. Grace — Henry A. Reemer
Charles R. Hook — E. L. Ryerson
Walter Howell — W. S. Tower
Elton Hoyt — Ernest T. Weir
R. J. Wysor

LABOR ADVISORY COMMITTEE
Philip Murray
David J. McDonald
Van A. Bittner
Lee Pressman
James J. Thomas
Joseph Germano

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NORMAN W. FOY, DEP. DIRECTOR
Special Assistants — J. A. Rowan, W. E. Ruder
J. A. Claus — R. W. Wolcott
Clark W. King
C. Sterry Long

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J. A. Claus, Vice Chairman
H. W. Bryant
L. E. Creighton
Norman W. Foy
H. J. French
Chas. Holcomb
C. H. Longfield
C. W. Meyers

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C. H. LONGFIELD
PRODUCTION DIRECTIVE COMMITTEE
C. H. Longfield, Chairman
Walter Wiswell, Vice Chairman
J. L. Block
Chas. Holcomb
J. V. Honeycutt
Carl W. Meyers
E. L. Parker
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R. W. Shannon, Sec'y

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Joseph L. Block, Vice Chairman
Paul T. Homan, Secretary
Col. Paul Llewellyn, Army
Major C. L. Sturgeon (Alternate) Army
Comdr. W. F. Amen (Alternate) Navy
Lt. H. W. Pearson (Alternate) Navy
F. W. Krebs (Alloy) Navy
Louis Baum, O.E.W.
Carroll Burton, Office Civilian Requirements
L. H. Christen, Land-Lease
P. R. B. Lawrence, Maritime
Major D. C. Bath, ARCO, Army Air Forces
Lt. Comdr. R. D. Hall, ARCO, Bur. of Aero
P. S. Harbrup, Dept. of Agr.
Meade McCamey, P.A.W.
Harold B. Miller, N.H.A.
E. T. Slinkard, O.E.D.
D. E. Langenecker, State Dept.
Chandler W. Jones, O.W.U. Div.
Nathan P. Fuller, Consultant
E. W. Gifford, Foreign Economic Bureau
C. H. Luedemann, Aluminum Div.
, Copper Div.
, Office Operations Vice Chairman

ASSISTANT DIRECTOR
RAW MATERIALS AND FACILITIES
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ASSISTANT DIRECTOR
FERRO ALLOYS
M. K. SMITH

ASSISTANT DIRECTOR
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M. H. Hofmann, Spec. Ass't.

ASSISTANT DIRECTOR
MAN POWER
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ASSISTANT DIRECTOR
PROGRAM AND DISTRIBUTION
J. L. BLOCK
T. S. Fish, Spec. Ass't.

ASSIGNED STAFF
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Information — Leon Bloch

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Carbon Bars Section
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Drop & Upset Forgings Sec.
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Armor Plate & Wheel & Axle Sec.
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J. J. Codd, Chief
Products Section
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Appeals Section
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Administrative Section
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Allocations & Allotment Sec.
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British Section
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Russian Section
W. Carroll, Chief
Latin-American Section
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General Export Section
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Merchant Trade Products Sec.
J. E. Fitzgerald, Act. Chief
General Steel Products Sec.
A. Y. Sawyer, Chief
Control Section
C. C. Fink, Chief

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Wire Rope & Strand Section
J. P. Barclay, Chief
Rod & Wire Products Section
H. E. Harmon, Chief

PIPE BRANCH
D. F. Lacey, Chief
J. W. Owings, Dep. Chief

Government Seeks Cancellation Of Two Patents Held By Cold Metal Co.

Cleveland

• • • **Attorney General** Francis Biddle announced last week the filing in the U. S. District Court here of an action seeking cancellation of two patents on methods and machinery for cold-rolling steel and other metals secured by Abram P. Steckel and owned by the Cold Metal Process Co., Youngstown.

According to government officials, the civil suit alleges that the patents were obtained through—"A fraudulent conspiracy" which has given Cold Metal a "monopoly" in the use of the methods and machinery involved. It was charged that the Government, through contractors, subcontractors and other suppliers of war materials, is being obliged to pay to Cold Metal "very large sums of money as royalties which in justice and equity defendant is not entitled to exact."

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Youngstown

• • • **"This same charge** of fraud has been raised by our opponents in every patent case we have brought against the builders and users of our patented mills—the first case was tried in 1932—and the courts have in every instance sustained Cold Metal's position and rejected that of its opponents on this question of fraud," said L. A. Beeghly of Cold Metal Process Co., commenting upon the government charges.

"Cold Metal has complete confidence that the courts will in this present case sustain Cold Metal's position that the patents are valid and that no fraud was perpetrated upon the Patent Office in connection with the issue of these patents."

Roy Johnson Named to WPB Facilities Bureau

• • • **Roy W. Johnson** has been appointed director of the WPB Facilities Bureau, succeeding Charles E. Volkhardt. Mr. Johnson has been deputy director of the bureau since the first of July. John B. McTigue was named as deputy director of the Facilities Bureau. Prior to this appointment Mr. McTigue had been assistant to the director.

Efforts to Conserve Critical Materials Through Redesign Are Rewarded

Cleveland

• • • **Ordnance citations,** recognizing outstanding performance in conserving critical materials through redesign, were presented to 14 Ohio and Pennsylvania manufacturers by Col. H. M. Reedall, chief of the War Department's Cleveland Ordnance District. This raises to 19 the total number of citations presented to Cleveland Ordnance District contractors, or about 25 per cent of the total presented to date throughout the country.

In recognizing the contributions made by manufacturers to the war production program, Col. Reedall stated that the work accomplished not only resulted in saving of materials, but also costs of production were frequently reduced, machining time saved and critical manufacturing processes freed by such conversions.

In many instances, the bottleneck in forging production was relieved somewhat by the substitution of stamped or drawn parts for forgings.

Some of the major developments for which citations were awarded were as follows:

Job	Conversion	Original Weight, Lb.	New Design Weight, Lb.	Savings	Award to:
Cal. 30, M-1 Carbine Trigger Housing	Forging to Stamping	1.38 lb.	0.675	0.705 lb. steel per housing 32.8 min. machine time per part 22 machine operations per part Cost cut 50 per cent per housing	C. W. Hannon, Murray Ohio Co., Cleveland J. D. O'Brien, Inland Mfg. Div. of General Motors Corp., Dayton, Ohio
Pintle for Machine Gun Tripod Mounts	Forging to Stamping	3	2.3	86.5 min. machine time per part 0.7 lb. steel per part 80 per cent reduction in cost per part	Walter Kaufman, Lovell Mfg. Co., Erie, Pa.
Rear Leg Hinge for .50 Cal. Machine Gun Tripod Mount	Bar stock to Stamping	3.55	1.7	1.85 lb. steel per part 5 min. machine time per part 75 per cent cost reduction per part	E. M. Tasker, Toledo Stamping & Mfg. Co., Toledo- Ohio
Fuze Adapter for 100-lb. Chemical Bomb	Bar stock to sheet stock	2.2	1.25	0.95 lb. steel per part Cost reduced considerably	E. H. Pinkus Great Lakes Stamping Co., Toledo, Ohio
Gear Carrier Fuze	Stainless steel bar stock to sheet steel	0.25	0.108	0.25 lb. critical stainless per part Machine operations eliminated Cost reduced considerably	H. W. Kost, Prestole Devices Division of Detroit Harvester Co., Toledo, Ohio
Vane Assembly for Bomb Fuze	Brass to steel	0.478	0.25	0.478 lb. critical brass per part Cost reduced about 35 per cent	Lester F. Kelch, Girard Mfg. Co., Girard, Pa.
Top Roller for Half-Track Vehicle	Steel Casting to Steel Weldment Construction	42	25	40 min. machine time per part Cost reduced by 55 per cent per part	Homer Mueller and Harry Kranz, Cleveland Welding Co., Cleveland
Adapter for Bomb Adapter Booster	Bar stock to Stamped Part	3.85	1.81	2.04 lb. steel per part Cost not reduced	W. G. Kilpatrick and W. R. Harrison, Spun Steel Corp., Canton, Ohio
Armor Piercing Shot	Machine Slug to hot pressed slug			0.75 lb. alloy steel per shot Now able to make 3 shot from same amount of material formerly required for 2 shot Machine time reduced, Cost reduced	Thorn Pendleton, Warren Tool Corp., Warren, Ohio
81 mm. Mortar Shell	Aluminum to drawn steel cups and steel stampings			Enough aluminum saved on present program to make 100 bombers Cost cut immeasurably	Daniel Dewey, Eaton Mfg. Co., Cleveland
50 cal. Machine Gun Barrel Forgings	Ordinary forging to "Gap Mill" forging			15,000,000 lb. of steel in 1943 production program $7,500,000 worth of machining time in 1943 production program 8 lb. of high alloy steel per gun barrel Barrels manufactured much faster Comparable saving in man-hours, tools, shipping weight, etc.	G. W. Waters, Midwest Forge Co., Cleveland

Small Firms Reported Receiving 48.8c. Out of the Procurement Dollar

Washington

• • • **Complete figures** on prime contracts for the purchase of manufactured products and an analysis of a cross section of subcontracting indicate that small manufacturers currently are receiving approximately 48.8 c. out of every procurement dollar spent by the Army Service Forces, for manufactured supplies, the War Department reported on Monday.

The report was based on the results of the department's small war plants program during the first six months of 1943. Nearly one quarter of each dollar—23.6 c.—goes directly to small plants on prime contracts from the procuring branches of the Army Service Forces. An analysis of 2987 ASF prime supply contracts, under which sub-contracting programs were known at the time of award, indicates that an additional 25.2 c. on each dollar is received by small plants through "first-tier" subcontracts.

On the basis of the number of such prime contracts let by the procuring branches of ASF during the first half of this year, the small firms got 65.2 per cent of the total, or 87,981. Their 23.6 per cent share of the dollar volume of prime contracts amounted to $2,078,645,000.

The War Department small war plants program has been a major effort on the procuring services. Among the special activities carried on under the supervision of the Small War Plants Branch, Purchases Division, Army Service Forces, for the purpose of further utilizing small manufacturing plants, was a concentrated reexamination of the prime contracts already held by 5526 larger prime contractors for the purpose of developing additional subcontracting which would both aid small businesses and speed production. This effort resulted in 7446 additional subcontracts with a value of $779,187,807. A number of other special moves to carry the War Department procurement program to the small manufacturer were undertaken.

The War Department's studies show that the Industrial Service Branch of the Army Air Forces Material Command is playing an important part in bringing together subcontractors and prime contractors. During the month of June alone, this branch reported 1671 new subcontracts with a value of $97,605,290.

The purchasing problem of the Army Air Forces Materiel Command varies from those of the ASF agencies in that the purchases made directly by this unit consist almost entirely of complete planes, large parts, or engines, so that many of its prime contractors are necessarily sizable concerns, but the small firms get their share of work through subcontracting, which is widespread and heavy.

An analysis of the subcontract reports of 252 of the largest war production prime contractors now being made at the request of the Chairman of SWPC is expected to reveal a more complete picture of the subcontracting with smaller concerns under all large prime contracts in existence both for the Army Service Forces and the Army Air Forces. The War Department has worked closely with the SWPC throughout.

Of the total 94,654 War Department prime contracts for manufactured products worth $2,278,935,000 placed with small concerns during this six months period, 3553 worth $401,310,000 were recommended or concurred in by the SWPC.

Quotes . . .

"WE are still a hell of a way from Berlin—and that's where we are headed." — *Donald M. Nelson, WPB chairman.*

"SIR, the guilt and folly of Mussolini have cost the Italian people dear. It looked so safe and easy in May, 1940, to stab a falling France in the back. . . ."—*Winston Churchill.*

"THE enemy persistently comes back again and again with seemingly endless replacements."—*Tokyo broadcast by Japanese air force officer.*

"ALL great industrial organizations like General Electric, General Motors, U. S. Steel, Ford and others are bureaucracies and would rattle themselves to pieces if they weren't." —*Secretary Ickes.*

"THE day of revengeful retaliation eventually will come, the day when the cup of hatred will finally overflow."—*Berlin broadcast by Dr. Paul Schmidt.*

"WE have passed from defensive to offensive war. Mobile artillery and mobile anti-aircraft artillery are our present needs. In some fields our Army has its initial equipment and its future requirements will be for replacement of battle losses. However, in the majority of items we are still not fully equipped. It will be well into 1944 before our troops, both here and abroad, will have all of their equipment. We have already shipped more tonnage to North Africa than was shipped from the United States to the A.E.F. in France in the entire last war."—*Lt. Gen. B. Somervell, commanding general, Army Service Forces.*

"WHILE concentrating on military victory, we are not neglecting the planning of things to come."—*President Roosevelt, July 28, in nationwide broadcast.*

"IT was a straight-out political speech and a bold bid for the vote of our soldiers and sailors. He launched his campaign for a fourth and perhaps continuing term." — *Harrison Spangler, chairman of Republican National Committee, discussing Roosevelt radio speech.*

"YOUNG Americans should know that there are two ways of doing business—one that makes money its master and one that makes money its servant. For 40 years the latter has been my style of business and I think it will be the only type of business that will succeed in the future."—*Henry Ford, on the eve of his 80th birthday last week.*

Ferromanganese Differentials Issued

• • • **Specific premiums** or differferentials which independent warehousemen may charge in sales of standard ferromanganese and other manganese alloys and metals were announced Monday by OPA.

These premiums are established in Amendment No. 1 to Revised Maximum Price Regulation No. 138 and become effective Aug. 7.

The amendment provides that the maximum prices at which independent warehousemen may sell manganese alloys and metal shall be the producers' maximum price to the warehouseman plus 10 per cent for quantities of 500 lb. or over, 15 per cent for amounts of 100 to 500 lb., and 20 per cent for amounts less than 100 lb.

The amendment also makes three other changes in the regulation.

1—It raises the maximum silicon content permitted in standard grade high carbon ferromanganese from 1.25 per cent to 1.50 per cent. This change is made because some consumers prefer standard ferromanganese containing slightly more than 1.25 per cent silicon.

2—It changes the quality premium on sales of less than 2000 lb. of electrolytic grade manganese metal to four cents a lb. from four-tenths of a cent, correcting a typographical error that appeared in the regulation.

3—Premiums for delivery of this metal to the Western Zone also are raised to 3.35c. from .55c. in carload lots, and to 4.75c. from 3.05c. in less-than-carload lots.

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Forging Price Adjustment Established

Washington

• • • **Provisions for the** adjustment of maximum prices charged by manufacturers of ferrous forgings, similar to those recently provided for manufacturers of machinery and for rebuilders and repairers of construction equipment, were announced last Friday by OPA.

To obtain any adjustment, the ferrous forging producer must qualify under sepcified tests based on the essentiality of his production and its service in the war program.

The action was contained in Amendment No. 4 to Maximum Price Regulation 351, which becomes effective Aug. 4, 1943.

To apply for an adjustment, an essential producer must complete Form OPA 694,411, which can be obtained in district or regional offices.

If the producer turns out $500,000 or more of ferrous forgings per year, the application must be filed with the National Office of OPA at Washington. If production is under $500,000 a year, the manufacturer must file with his regional OPA office.

The amendment sets out several factors relating to costs and profits position of the manufacturer during a normal base period, competitive prices, and other cost factors which OPA will consider in determining whether the adjustments should be granted.

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More Furnace, Stove Parts Planned

Washington

• • • **Further evidence of** WPB's new loosening up policy respecting civilian needs was reflected in its action last week to insure sufficient supplies for worn parts, and when necessary, to replace worn-out domestic heating furnaces, stoves, ranges and water heaters. While declaring that its move was in accordance with its policy of meeting essential civilian needs, WPB said that it does not follow that greatly increased production of these articles will result.

WPB also authorized a small amount of production to meet other essential civilian requirements by amendment of L-22, furnaces, L-185, water heaters, and L-23-c, domestic cooking appliances and domestic heating stoves.

By placing the control of furnace production directly under CMP, L-22, as amended enables the WBP to meet fluctuating demands. Under such control, materials will be allocated for the production of furnaces at a rate based upon actual requirements of the Army, Navy, Maritime Commission, War Shipping Administration, war housing and essential civilian needs. Order L-22 further requires that furnaces shall be delivered only on orders rated A-10 or higher.

The amended L-23-c removes quota restrictions imposed upon individual producers but definitely specifies the quantity of the different types of stoves that may be produced. The revised order also provides for the return to production of the larger firms as necessary. L-23-c, as amended, also provides a simplification program.

L-185 in its amended form revives production of water heaters for essential civilian uses, which include necessary replacements.

•

Sellers Authorized to Propose Prices for Magnesium Shapes

• • • **Sellers of** magnesium or magnesium alloy ingot in special non-standard shapes which cannot be produced at the premium of one cent a pound permitted for non-standard shapes, were authorized July 30 to submit proposed prices for such shapes to OPA.

The authorization is contained in Amendment No. 3 to Maximum Price Regulation No. 314 (Magnesium and Magnesium Alloy Ingot.)

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L-41 Altered to Conform With Related Regulations

Washington

• • • **Minor changes** in Order L-41, which controls wartime civilian construction, were made by WPB to reflect changes made in other orders.

Since Order U-6 places facilities owned by telegraph companies under adequate priority control, it was considered unnecessary for telegraph installations to be also controlled under L-41. Likewise, sewerage facilities are now controlled by Order P-141, administered by the government division, so additional controls under L-41 are not necessary. The action excepts these from terms of L-41.

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AA-2 Assigned Welding Rods

Washington

• • • **Direction No. 10** to CMP Regulation No. 5, issued last week by WPB, assigned a preference rating of AA-2 to repair shops for the acquisition of welding rod. This rating may be used regardless of whether or not the shop carries welding rod as an operating supply.

The weekly lists of priority changes, CMP developments and price briefs will be found on pages 146 and 148, followed by additional priority and price news reports. Also, there are items from pages 105 to 126.

Warehouse CMP Answers Given by WPB

• • • **A series of interesting questions related to warehouse operations under CMP regulations have been asked by members of the Steel Products Warehouse Association, Inc. Authoritative answers to these questions received direct from Washington by the association follow:**

• Q—Warehouses formerly were allowed to exceed their prime quota in any products group by 50 per cent if they cut down proportionately in some other product group. May they continue to do this now that quarterly quotas for scheduled rollings have been raised from 25 per cent to 37½ per cent of 1940 purchases?

No. A warehouse may not in any quarter buy scheduled rollings in any product in excess of 37½ per cent of total 1940 purchases of scheduled rollings in that product group.

• Q—Order M-21-b-1 as revised effective July 1, eliminates percentage restrictions on allowable scrap loss and permits warehouses to order steel to replace all scrap arising in warehousing operations and actually sold in the previous 90 days. However, Form CMP-11 still carries the percentage restrictions and may create difficulties at the mills. What will be done about this?

CMP-11 is being revised and the new form will be available soon.

• Q—Can a warehouse which does not have a prime quota sell as primes material of prime quality purchased from distress stocks or excess primes purchased from producers?

A—Yes.

• Q—Can a warehouse, without WPB approval, place an order with a holder of distress stock for shipment of 40,000 lb. or more direct to a warehouse customer?

Yes—if the warehouse is satisfied with getting the price established in Price Regulation 204. If a warehouse wants a Schedule 49 price, it must take physical delivery of the material.

• Q—May a warehouse accept without WPB approval an order for 100,000 lb.—calling for delivery in three equal monthly parts?

Yes—if it's a bona fide order.

• Q—If such an order for 100,00 lb. can be accepted without WPB approval, how shall it be priced?

OPA must establish a price on any order or shipment in excess of 40,000 lb. OPA cannot establish a price without a WPB certificate. If a warehouse wants to sell in excess of the mill price, it will have to go to WPB for such a certificate regardless of whether or not WPB requires that such a certificate be obtained. In other words, WPB may allow you to accept a large order without approval but OPA won't price it until and unless WPB certifies its approval.

Section 1306.159 (k) (5) of RPS No. 49 does not permit a warehouse to accept an order at higher than the mill price as established by RPS No. 6 unless WPB furnishes a certificate to OPA and a price is established at a higher level by this office in accordance with the provisions contained in this section. We have discussed this matter with WPB and we understand that, when the facts presented will allow them to make a certification that (1) the shipment is in the interest of the war effort, and (2) that shipment from a mill is not practicable or possible, a certificate will be available to sellers who find such certificate necessary to obtain the level of prices this office could establish.

• Q—If a mill ships in July, tonnage ordered for June on CMPL-85, is the receipt of this material charged against the CMPL-85 second quarter quota or against the third quarter quantity limits in a particular product group?

If a mill exercises its privilege to ship June scheduled tonnage under CMPL-85 during July, the receipt of this material may be charged against second quarter CMPL-85 authorization. In reporting this material on PD-83, it is necessary to report receipt of it in the month in which it was received.

• Q—If a warehouse performs a shearing service on material which it does not sell, is the shearing charge based on Schedule 49?

No. The shearing charges in Schedule 49 are for material which is sold from warehouse stock. Shearing performed as an independent service is governed by the General Maximum Price Regulation which establishes a ceiling at the highest charge made on a comparable transaction in March 1942.

• Q—Must a warehouse still file a report with OPA when it makes 5 shipments or less to one customer in a semi-monthly period, the total tonnage of which is 40,000 pounds or more.

Yes. This report must be filed by the 15th of the month following. It must be supported by affidavit and shall include names and addresses of buyers, full description of products shipped, and prices charged including extras. Copies of invoices accompanied by affidavit will suffice.

o o o

Used Machine Tool Pricing Clarified

Chicago

• • • **To give a quick perception** of how used machine tools are priced under Price Regulation No. 1, the Chicago Association of Commerce has issued briefed information on the order. Emphasizing the fact that ramifications of the order have not been covered completely, the association warns that the official text should still be followed closely

Used Machine Tools. Machine tools are machines for cutting (except heat cutting) abrading, forming, shaping, straightening, and forcing of metals —except portable machine tools. Maximum Price Regulation No. 1 provides that ceiling prices should be computed by the percentages set forth below of the March 1, 1941, price of the nearest equivalent new machine tool or extra having a price in effect on that date.

The date of manufacture is determined from the serial number stamped on the machine by the manufacturer.

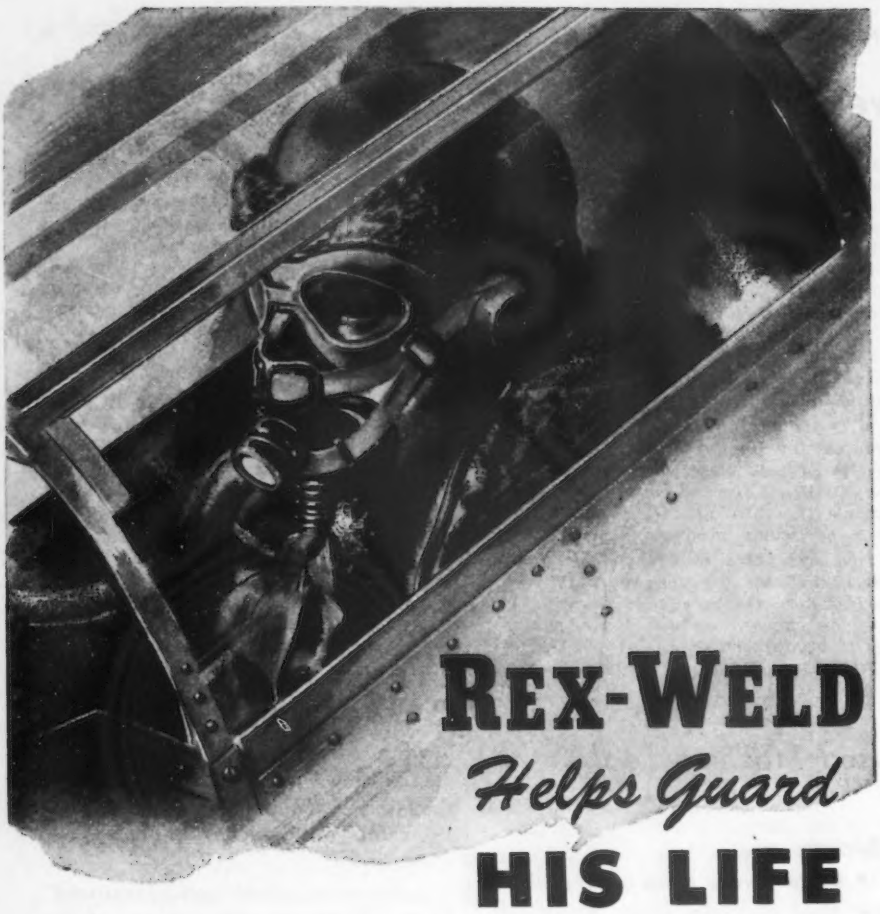
Used Industrial Machinery other than used machine tools and industrial sewing machines. Maximum Price Regulation No. 136 provides that used industrial machinery may be priced by using one of the following two methods:

Sales on a "rebuilt and guaranteed" basis. Either the 85 per cent of the base price new or the alternate depreciation method set forth in Amendment 76 may be used. The depreciation method provides that you determine and confirm the age of the machine to the buyer in writing. The age of the machine is the period between date of purchase new and the present resale date. Fractions of a year may be used. The depreciation rate set forth in Amendment 76 for that type of equipment is then multiplied by the age and the resulting figure applied to the base price of the machine.

Sales on an "as is" basis. Either the 55 per cent of the base price or the depreciation method may be used. In no event may the "as is" price by using the depreciation method exceed 80 per cent of the base price. Otherwise the depreciation method for an "as is" machine operates the same as that for a "rebuilt and guaranteed" machine.

CLASSIFICATION: Age and condition

Date of Manufacture	1 Jan. 1, 1936, and after	2 Jan. 1, 1930, to Dec. 31, 1935	3 Jan. 1, 1920, to Dec. 31, 1929	4 Before Jan. 1, 1920
Rebuilt and Guaranteed	Per cent 95	Per cent 90	Per cent 80	Per cent 70
Other Condition.	70	65	55	45



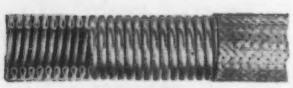
REX-WELD *Helps Guard* HIS LIFE

REX-WELD Flexible Metal Hose has met the critical test that demands only the best materials for our combat planes. More and more bombers, fighters and interceptor-pursuit ships are being Rex-Weld equipped.

REX-WELD's war service is not confined to the planes themselves. In the steel mills and munition factories, on the production and assembly lines, everywhere that war-worthy flexible connections are needed, REX-WELD is rendering vital service.

There are specific reasons for this. REX-WELD is a specially constructed flexible metal tubing. It is fabricated from strip metal by a precision autogenous welding process that produces uniform, stronger wall structure plus extreme flexibility. REX-WELD stands up under high pressures, high and low temperatures, extreme contraction and expansion. It is seep-proof to gas, water, oil, air and searching fluids.

Type RW-81
(annular corrugations)



Type RW-91
(helical corrugations)

Available in continuous lengths to 50 ft. Both Steel and Bronze. 3/16" I. D. to 4" I. D. inc. Pressures to 14,500 p.s.i. Temperatures to 1000° F.

Write for Engineering Recommendations

CHICAGO METAL HOSE CORPORATION

General Offices: MAYWOOD, ILLINOIS

Factories: Maywood and Elgin, Illinois

Military Servicing Is Price Exempt

• • • **Exemptions from price** control of charges for specified services on airplanes, tanks and military vehicles for any war procurement agency were clarified by OPA last week.

Any servicing of these airplanes, whether in their preparation for shipment or subsequent servicing, is exempt from price control.

Any servicing of tanks and military vehicles made in connection with their preparation for shipment, such as performed by the makers of the machines, is exempt from price control.

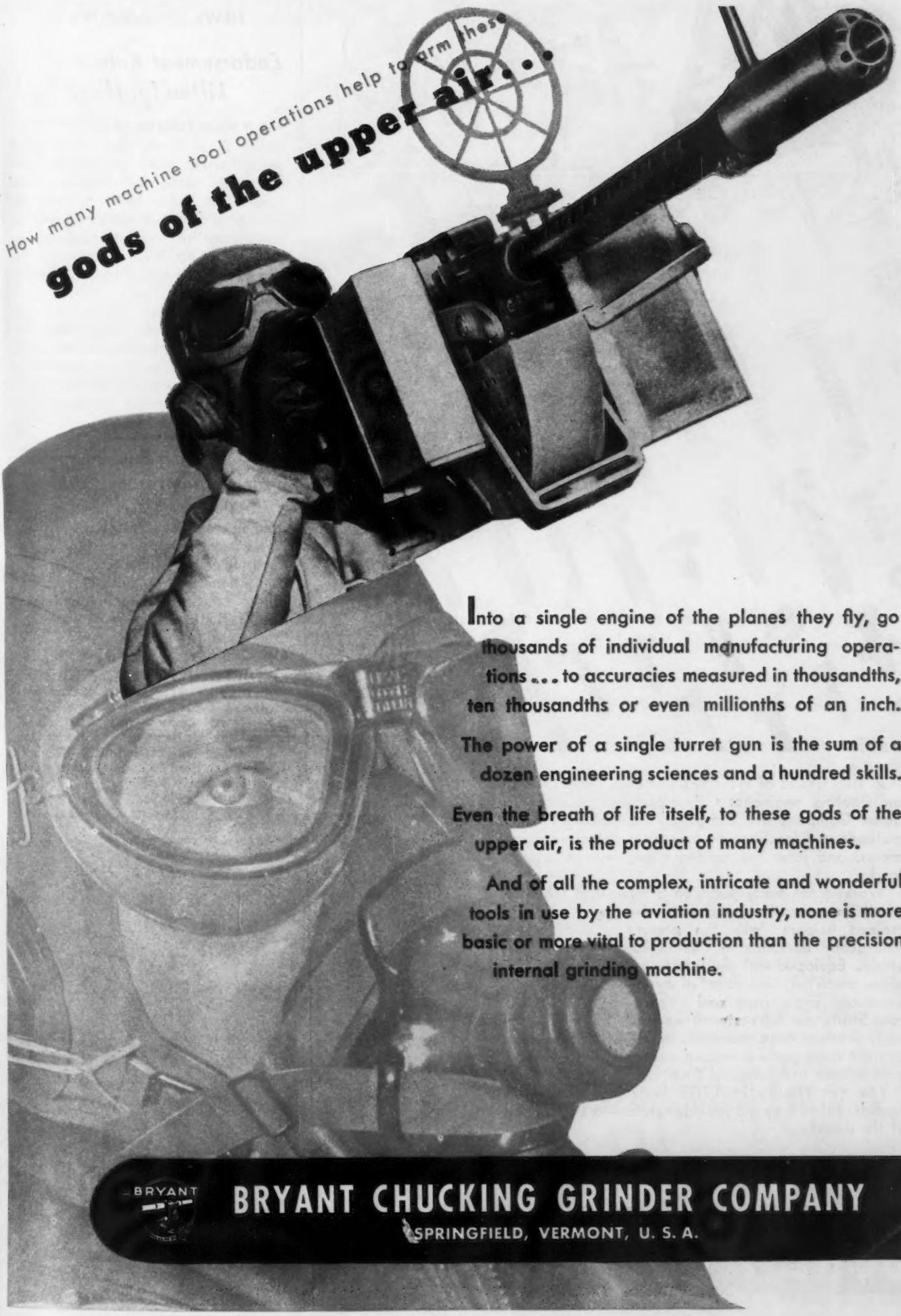
Subsequent outside servicing of tanks and military vehicles, such as the repair or lubrication of an Army car at a garage or service station, is not exempt from price control. MPR No. 165 will apply, with ceilings at highest March 1942 charges.

Engines, parts, accessories, instruments and other equipment on the airplanes, tanks and military vehicles are covered.

MORE TONNAGE: Pig iron output in Pittsburgh's war-busy "Victory Valley" soars to new heights as Carnegie-Illinois Steel Corp. begins producing at "C" furnace, erected for the DPC at the Edgar-Thomson Works.

How many machine tool operations help to arm these

gods of the upper air. . .



Into a single engine of the planes they fly, go thousands of individual manufacturing operations . . . to accuracies measured in thousandths, ten thousandths or even millionths of an inch.

The power of a single turret gun is the sum of a dozen engineering sciences and a hundred skills.

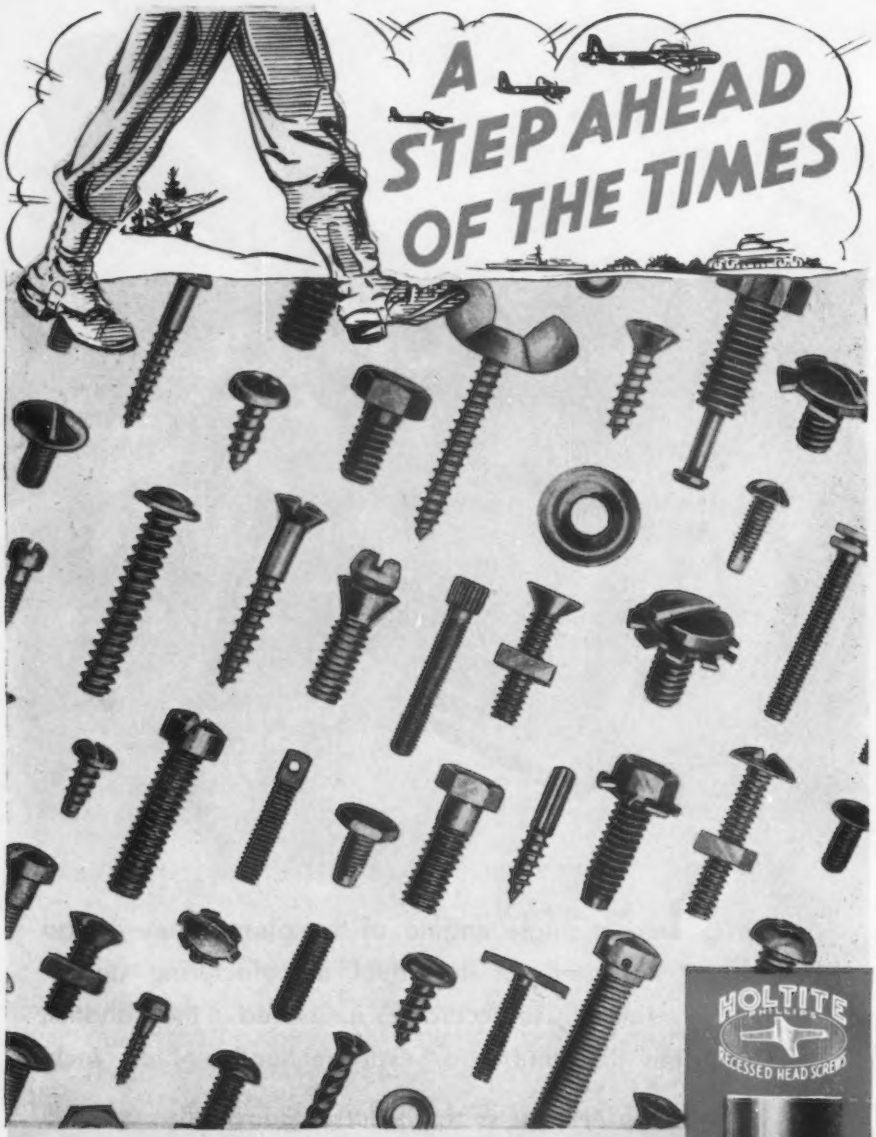
Even the breath of life itself, to these gods of the upper air, is the product of many machines.

And of all the complex, intricate and wonderful tools in use by the aviation industry, none is more basic or more vital to production than the precision internal grinding machine.

BRYANT

BRYANT CHUCKING GRINDER COMPANY

SPRINGFIELD, VERMONT, U. S. A.



A step ahead of industry's demands since 1904 by anticipating engineering developments, Continental Screw Company was completely equipped with men, methods and machines to fully meet defense requirements, and later the sudden heavy war production load.

Working for many years on a three-shift schedule, our skilled operatives, augmented by trained helpers, take the present emergency demands in their usual stride. Equipped with the latest precision machines, and directed by experienced Engineering and Laboratory Staffs, our full roster of workers daily produce huge quantities of HOLTITE fastenings . . . the most precise, rugged and enduring assembly units science and human skill can devise.

You can specify HOLTITE fastenings completely confident that they will provide service—a step ahead of the times!

CUT YOUR FASTENING TIME 50%

CONTINENTAL SCREW CO. New Bedford, Mass., U.S.A.
BUY MORE WAR BONDS

Endorsement Rule Is Lifted for Hand Tools

• • • **Since Direction 9** to CMP Regulation 5 now provides an overall method under which workers may obtain hand tools, including precision measuring hand tools covered by General Preference Order E-5-a, an amendment to the latter order has been issued by WPB eliminating the special endorsement formerly needed for tools of this type.

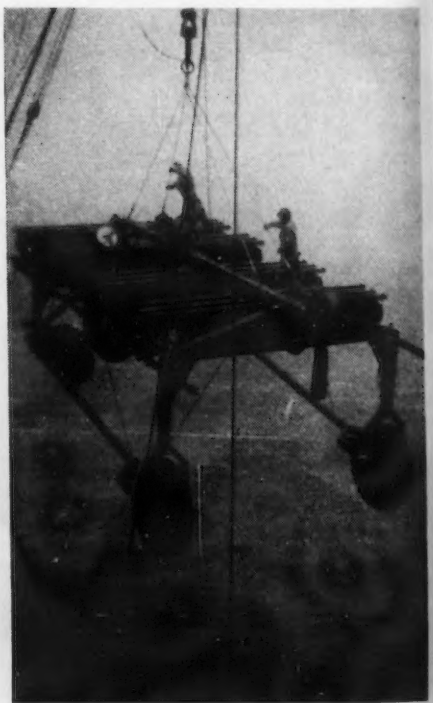
The amendment eliminates the special endorsement after Aug. 15, which allows a transition period in which to inform the trade, and recognizes orders placed under Direction 9 to CMP Regulation 5 as permissible orders to fill.

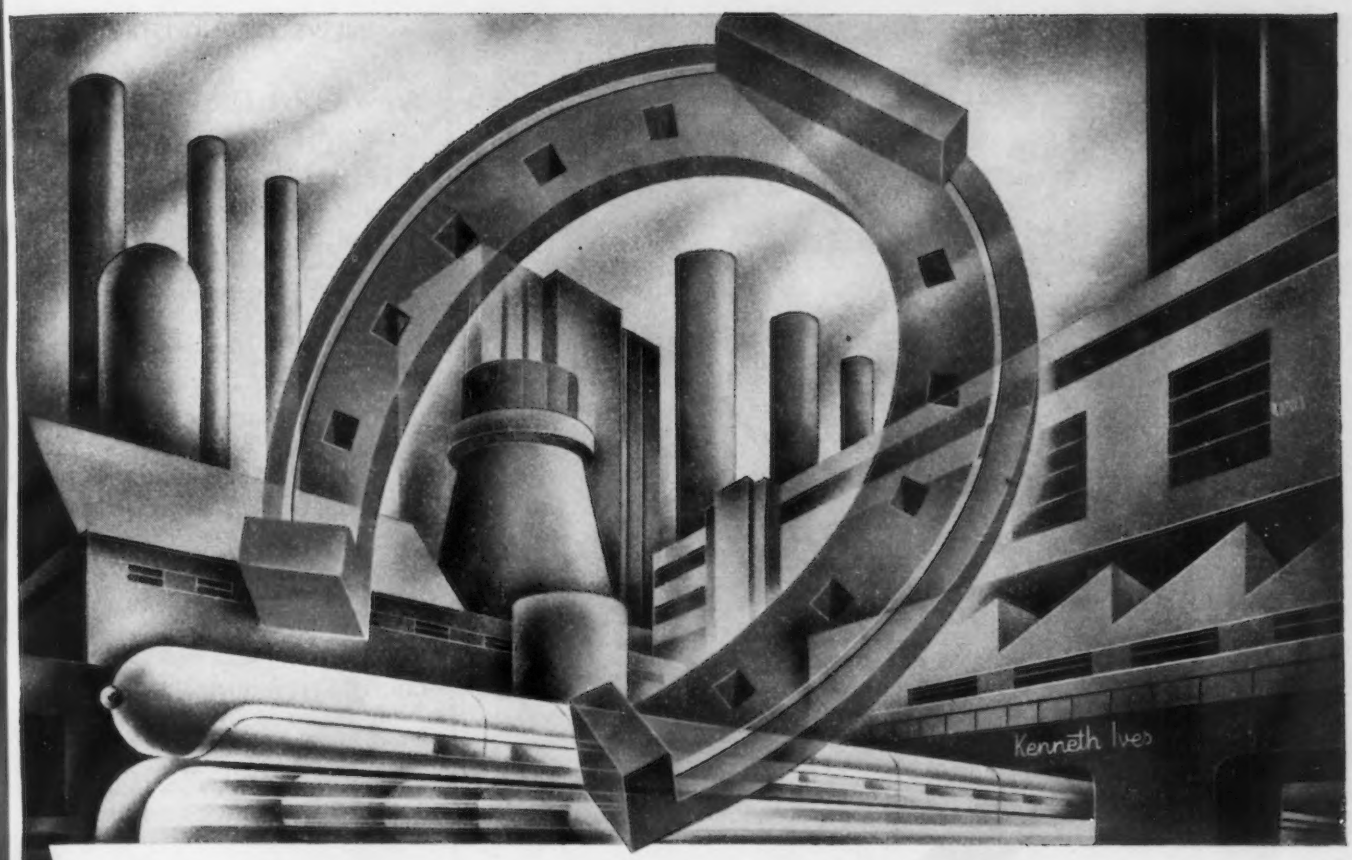
Early Welding Equipment Orders Exempt from L-298

• • • **Purchase orders** for resistance welding equipment received prior to July 27 are exempt from the restrictions on delivery imposed by General Limitation Order L-298. This change in the order is made in an amendment issued recently by WPB.

SEABEES OVER THE SIDE: Two men go over the side of a transport aboard the "geeheebee" which will be towed ashore on Attu Island. The oil drums are to keep the gangling object afloat. "Geeheebees" are used in construction work, to lift boats and barges, and as movable dry docks.

Official U. S. Navy Photograph





You Don't Know How Lucky You Are

... Lucky that medical directors, industrial nurses, and safety engineers are doing the fine job they are in keeping limited man-power effective and productive ... lucky that these far sighted executives developed the tools and techniques to fight occupational disease and accidents before war pressure made the need for them acute.

One such technique is a "Planned Procedure" featuring a new product designed to *combat* industrial dermatitis, not merely guard against it.

This new product, TARBONIS CREAM, has proved its effectiveness in ridding plant after plant of dermatitis due to cutting oils, chemical exposure, and some of the most difficult irritants in a dozen different industries. The proof is in its rapid acceptance by trained men in industry —the men who know.

An industrial physician and a progressive safety engineer in an Ohio ordnance plant, troubled with an average of 30 to 40 new cases of dermatitis a week, worked out a plan and procedure using TARBONIS CREAM. More than six months have passed, and not one case of occupational dermatitis has developed in that plant.

One of the world's largest plastics companies voluntarily wrote users of their irritating phenol-formaldehyde resins that a procedure using TARBONIS CREAM had proved the most effective method in twenty years of effort.

Here are examples of what medical directors, safety men, and first aid departments accomplish when they have the tools to work with, and the cooperation they must have to complete their vital work.

If occupational skin irritations are causing a problem in your plant, this "Planned Procedure" may solve it. Write for full details.

Listed below are a few, less than one per cent of the total number, of companies in one or more of whose plants TARBONIS CREAM is now at work.

THE TARBONIS COMPANY
1220 HURON ROAD • CLEVELAND, OHIO

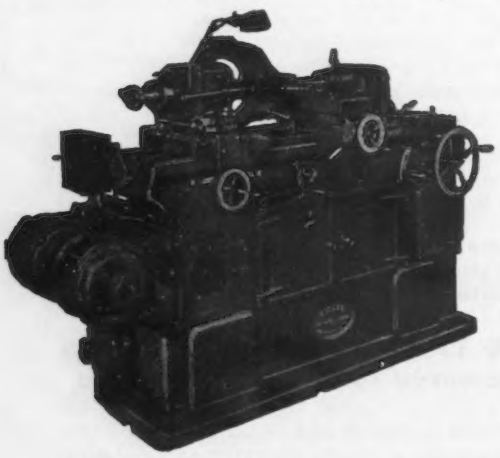
ALUMINUM COMPANY OF AMERICA • ATLAS POWDER • BOHN ALUMINUM AND BRASS • CRAMP SHIP-BUILDING • CURTISS-WRIGHT • E. I. DuPONT DeNEMOURS • DUREZ PLASTICS AND CHEMICAL GENERAL ELECTRIC • GENERAL MOTORS • JACK & HEINTZ • NASH-KELVINATOR • WAYNE-BENDIX

Tarbonis
cream

FOR INDUSTRIAL SKIN IRRITATIONS

WICACO INTERNAL GRINDERS

The precision and speed of the Wicaco Internal Grinder contributes to the speed and accuracy of American fighting planes by helping to make aircraft engine parts, bomb sight components and other parts requiring extreme grinding accuracy. Underslung drive, vibration-free and in constant tension . . . Rigid work head with over sized bearings . . . Dynamically balanced revolving parts — these features are responsible for the exceptional accuracy of the Wicaco Internal Grinder. Deliveries can be made promptly under priority regulations. Shipped complete, with electrical equipment ready to hook up and operate immediately. Write for complete descriptive matter.



75th YEAR

THE WICACO MACHINE CORP.

WAYNE JUNCTION, PHILA., PA.

New OPA Digest Of Price Regulations

• • • **OPA has recently released a series of special digests of interpretations of price schedules and regulations. From these THE IRON AGE has compiled the following which are of particular interest to the iron and steel and metal working industries:**

IRON AND STEEL

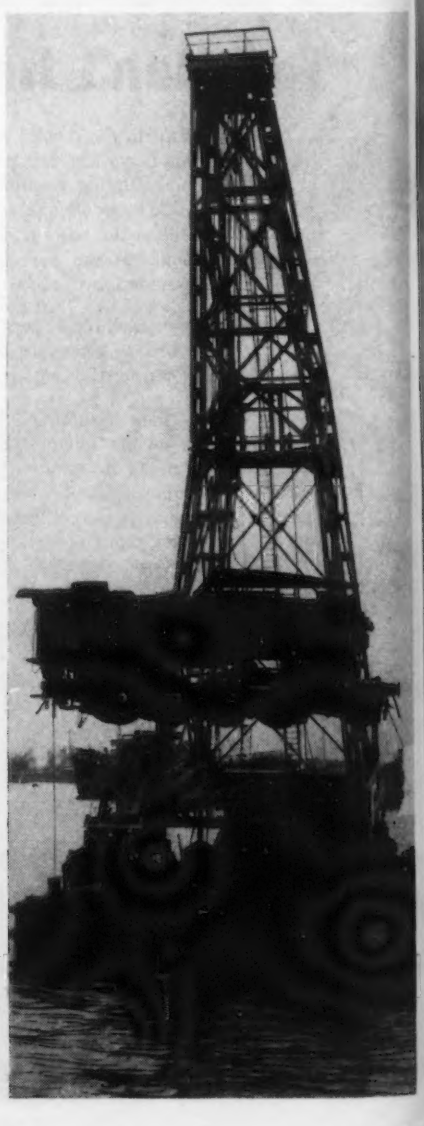
PS No. 4 — Iron and Steel Scrap

Price Determination

Welding rod butts—Butts over ⅛ in. dia. and less than 2 ft. in length coated may be charged into the furnace without removal of the coating are an unlisted grade inferior to No. 1 heavy melting steel, item 1, and in the absence of the base period experience required under Section 1304.13 (a) (7) should be priced

LOCOMOTIVE FOR THE ALLIES: Somewhere in North Africa a huge locomotive is taken ashore on a floating crane.

Signal Corps Photo from OWI
Harris & Ewing News Photo



2¢ WOULD HAVE PREVENTED THIS SHUT DOWN

. . . . 2c MORE FOR A NON-RUSTING BOLT IN A VITAL PART

CAN A COUPLE OF PENNIES more per bolt save thousands of dollars? Indeed they can . . . and Harper Fastenings are proving it every day. Saving huge sums by preventing hidden destruction by rust and corrosion. They help war production machinery to stand up under today's grueling speed and overtime.

Such tremendous trifles, these Harper non-ferrous and stainless fastenings. Trifling too, in their extra cost. Yet tremendous in their usefulness.

4320 STOCK ITEMS . . . of bolts, nuts, screws, washers, rivets and accessories in the non-ferrous and stainless alloys.

WRITE FOR CATALOG . . . and reference book—80 pages—4 colors—193 illustrations—numerous tables and other data. Free when requested on a company letterhead.

THE H. M. HARPER COMPANY
2607 Fletcher Street, Chicago
BRANCHES: 45 West Broadway, New York City; 1617 Pennsylvania Blvd., Philadelphia; 332 I. N. Van Nuys Bldg., Los Angeles.
Offices in Principal Cities

HARPER *Chicago*
EVERLASTING FASTENINGS

ARMY E NAVY
Awarded Dec. 7, 1942
Star added June 7, 1943

BRASS • BRONZE • COPPER • EVERDUR • MONEL • STAINLESS

at $3.50 per gross ton below No. 1 heavy melting steel.

Premiums for nickel content, Section 1304.13 (a) (4) (i). In applying the premiums for nickel content under Section 1304.13 (a) (4) (i), the premium should be based upon the average nickel content of the material in each vehicle, the average to be determined according to standard analysis practice. Thus, if a car of nickel turnings contains turnings of varying nickel content, the average will control. However, if plain carbon turnings are mixed with the nickel turnings, no nickel premium is allowable.

Brokerage commission—hauling and sorting scrap. A dealer who accumulates in his yard, borings and turnings from one or more industries until he has a carload quantity for shipment by rail may not charge a brokerage commission on such scrap, since hauling and storing of scrap in a dealer's yard is one of the operations commonly performed by a dealer, and is regarded as "preparing" scrap under Section 1304.6 (a).

A producer of turnings and borings who sells them to a dealer or broker, briquetted by the producer, but in hauling to the purchaser's yard and unloading some briquettes are broken, and must be sorted, the sorting out of the broken briquettes is "preparation" within the meaning of Section 1304.6 (a), and hence no commission may be added to the maximum price of the broken or unbroken briquettes.

Charges for delivering scrap in private truck. Where scrap is delivered by private truck, the Schedule permits the addition of a charge for transporting the scrap at "the established rail carload rate for the lowest minimum weight," Section 1304.13 (d) (2) (ii) and Section 1304.15 (b) (2) (ii). This means that where there are several different carload rates, each progressively higher as the minimum weight requirement is reduced, the seller may use the rate with the lowest minimum weight requirement. Thus, if there is a carload rate with a 30,000 lb. minimum, and a carload rate with a 50,000 lb. minimum, the 30,000 rate may be used to determine the maximum trucking charge.

Classification

Alloy free scrap. Certain grades of steel scrap in Section 1304.13 (for example, item 15, Cast steel), must be "alloy free" to command premium prices. If steel scrap contains any one of the following alloys in the same or greater quantities than those stated below, it is not considered alloy free: Nickel, .45 per cent; molybdenum, .10 per cent; manganese, 1.65

COUNT 'EM BY THE THOUSANDS *Like Lightning!*

At airplane plants, thousands of parts for huge bombers are checked in daily at receiving docks, or issued from stock, with Toledo Counting Scales!

● Gear up production, increase accuracy and save labor... by *counting thousands of small parts in a few seconds* with Toledo Scales!

Easy for "green help" to operate. Whether it's issuing predetermined quantities of uniform parts... counting unknown quantities... faster inventory counts... or to get accurate receiving, shipping, production, cost and piece-work counts — COUNT BY WEIGHT the faster, better Toledo Way! Write for booklet "Counting by Weight". Sales and Service in 181 cities. Toledo Scale Company, Toledo, O.

TOLEDO

COUNTING SCALES

ask for this 7-MINUTE STORY

ABOUT A NATIONAL TOOL-ENGINEERING SERVICE

Here's the brief factual report of how the **HECKER** organization designs and builds production tools for many industries—both large and small.

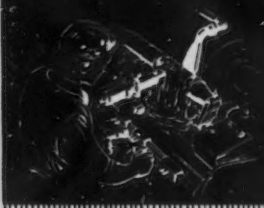
Perhaps it suggests a solution to some of *your* tooling problems. If there's the slightest possibility of your needing outside specialized service on production tooling—make a request for your copy of this **HECKER** booklet to the nearest A. W. Hecker office (addresses below)—mention Dept. F.

A·W· Hecker

DESIGNERS AND BUILDERS OF TOOLS, JIGS AND FIXTURES—FABRICATORS OF AIRCRAFT PARTS

CLEVELAND, OHIO	NEW YORK, N. Y.	BUFFALO, N. Y.	DETROIT, MICH.	CHICAGO, ILL.	LOS ANGELES, CALIF.
1976 East 66th St.	1775 Broadway	443 Delaware Ave.	517 New Center Bldg.	332 So. Michigan Ave.	3723A Wilshire Blvd.

RUTHMAN



Gusher Coolant Pumps

THE OUTSTANDING COOLANT PUMP TODAY

FLANGE MOUNTED TYPES

PIPE CONNECTED TYPES • IMMERSED TYPES

Cutting tools are made of strategic metals. Avoid wasting these metals and improve your production at the same time by using the proper cutting oils delivered in ample volume by the proper coolant pumps.

The proper coolant pump these days is the Ruthman Gusher Coolant Pump — preferred by so many machine tool builders and users. It was perfected to a high degree long before the war, and it admirably serves the needs of war production — being more free from troubles involving maintenance.

The RUTHMAN MACHINERY COMPANY

CINCINNATI, OHIO

per cent; chromium, .20 per cent. If nickel, chromium and molybdenum are present in the same steel, it is not considered alloy free if the combined elements exceed .60 per cent.

These limitations do not apply to grades containing alloys in a sufficient amount to permit an alloy premium under Section 1304.13 (a) (4).

PS No. 46 — Relaying Rail, Relaying Girder Rail, Used Track Accessories

Applicability

Rail in ground. A company purchased a quantity of rail when in the ground, removed it and relayed it on its premises. The sale is not covered by Schedule No. 46, because it is a sale of track and not of rail. Schedule No. 4 (Iron and Steel Scrap) does not apply because the track is not being sold to a "consumer" of scrap. The General Maximum Price Regulation is applicable, but such a sale is exempt under Section 9 (b) (2) as a sale in which the seller did not acquire the track for resale.

MPR No. 235 — Manganese Steel Castings, Castings Products

Price Determination

Adding pattern charges to maximum prices. (a) Where a producer makes a pattern or has

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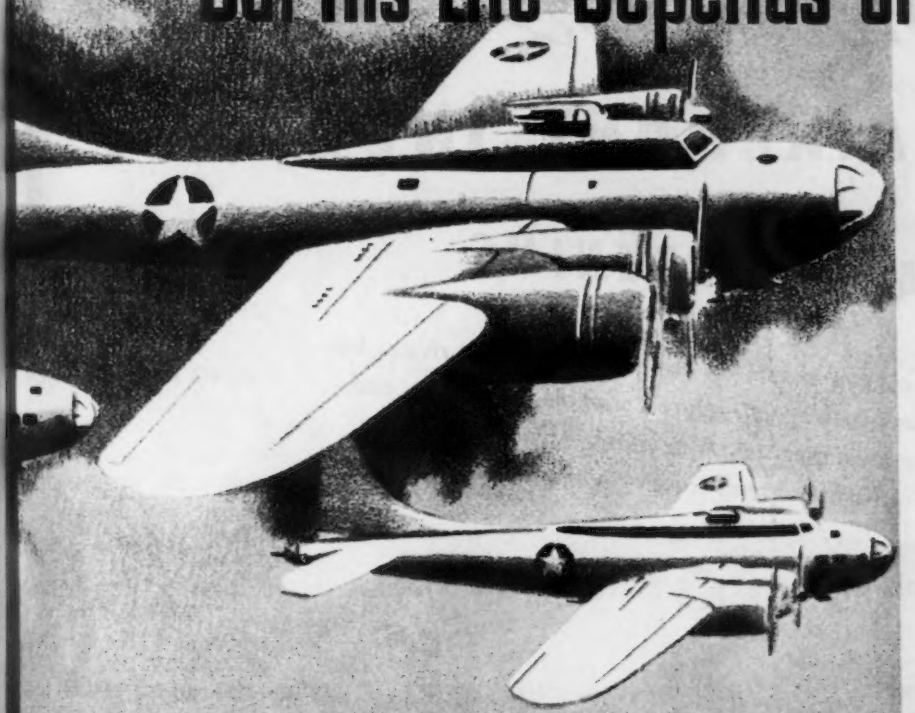
NEW POWER PLANT: First photo of the Quad, new diesel power plant developed by Detroit Diesel Engine division of General Motors for Navy landing barges. The unit is made up of four series 71 six-cylinder, two-cycle standard diesels mounted over a centrally located gear box, with all four engines driving through this one gear box.

Gunner Gates Never Heard of These Men... But His Life Depends on Their Work!



Cutting Tool Industry Meets "Impossible" Demands of a Fighting America!....

It took plenty of the right kinds of cutting tools to get America's war production where it is today! Cutting tools for the machine tools that turn out deadly guns, fast planes, mighty tanks, avalanches of hard-hitting weapons. The stuff victory is made of!

Producing plenty of the right kinds of cutting tools . . . *right on time* . . . posed many an "impossible" problem. Substitute materials had to be found . . . Production facilities had to be expanded tremendously. Then there was the manpower shortage; and serious engineering problems also presented stumbling blocks.

The engineers of the cutting tool industry found the answers fast by tapping rich resources of years of know-how experience. Typical of these "combined" operations is the meeting of Barber-Colman engineers pictured above. Out of just such conversations came war-vital achievements.

For instance Barber-Colman engineers developed a series of special taper cartridge chambering reamers and a fixture for mechanically sharpening them which saved hundreds of man-hours. Hand stoning was banished and total sharpening time reduced from as much as 6 hours to approximately 30 minutes.

Doing the impossible has become a habit with the men and women of Barber-Colman. Today, we're proud to be turning out many times more and finer cutting tools for more war industries than ever before. Tomorrow, this same kind of performance shall be yours to command in solving problems of production for life after victory.

Barber-Colman Company

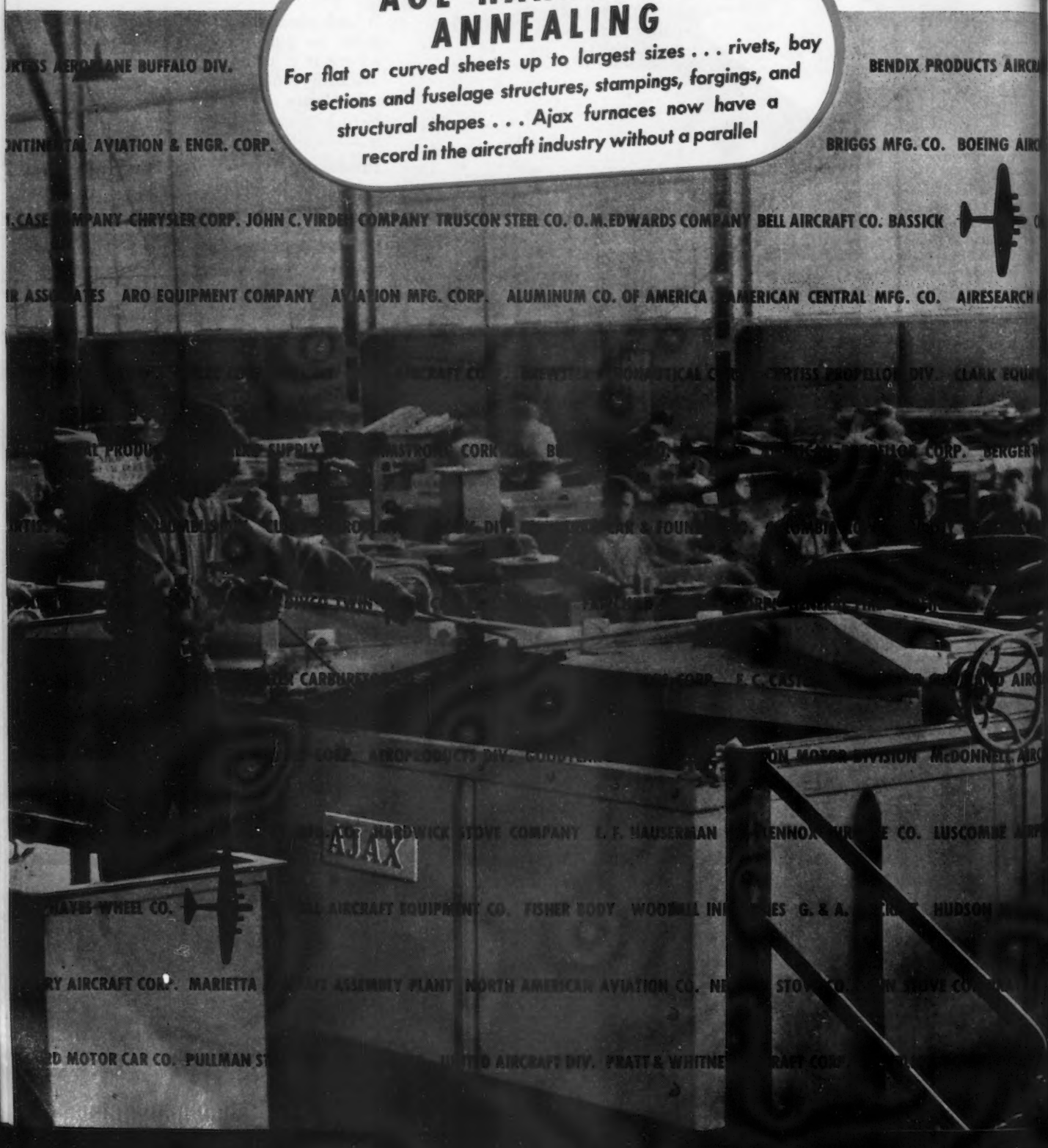
GENERAL OFFICES AND PLANT • 204 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

Complete Cutting Tool Service • Engineering • Manufacturing
Hobs • Milling Cutters • Reamers • Special Tools • Sharpening Machines

'Ajax' Solution
HEAT TREATMENT
of Aluminum Alloys
FOR THE AIRCRAFT INDUSTRY

AGE HARDENING
ANNEALING

For flat or curved sheets up to largest sizes . . . rivets, bay sections and fuselage structures, stampings, forgings, and structural shapes . . . Ajax furnaces now have a record in the aircraft industry without a parallel



RONAUTICAL CORP. ROLLWAY BEARING CO. STEARMAN AIRCRAFT CO. SCINTILLA MAGNETO DIV. SOLAR AIRCRAFT CO. STUDEBAKER COR
COOLED ENGINE DIV. SPERRY GYROSCOPE CO. SCHRILLO AERO TOOL ENGINEERS THOMPSON AIRCRAFT PRODUCTS CO. SKF INDUSTRI
ON PRODUCTS CO. TRANSCONTINENTAL & WESTERN AIR NAVAL AIR STATIONS AIR CORPS WRIGHT FIELD ARMY AIR DEPOTS BUREAU OF AERONAUTI
AUTOGIRO CORP. KAWNEER COMPANY KNAPE & VOGT MFG. CO. SKC AIRCRAFT DIV. HOLLEY CARBURETOR CO. SPICER MFG. COR
CHICAGO PLANT WRIGHT AERONAUTICAL CORP. ART METAL CONSTRUCTION CO. VEGA AIRPLANE CO. WESTINGHOUSE ELEC. & MFG. C
DVISORY COMM. FOR AERONAUTICS U. S. RUBBER COMPANY HOUDE ENGINEERING CO. INTERCONTINENT AIRCRAFT CORP. KELSEY HAYES WHEEL C

WHY U. S. AVIATION INDUSTRIES STANDARDIZE ON AJAX FURNACES

The method by which heat is *imparted* to aluminum alloys is the most important single factor determining physical properties during solution heat treatment and annealing. Molten salt is the fastest heating medium known, eliminating grain growth. A salt film likewise eliminates oxidation and retards air chill on transfer to the quench. Moreover, treating in salt imparts definite corrosion-resistant properties.

The entire aviation industry is aware of this, and Ajax Electric Salt Bath Furnaces are its choice today, not only for treating aluminum, but for all exacting processes in the 350 to 2400° temperature range. (REPRESENTATIVE USERS SHOWN HAVE NOT ONE BUT MANY TYPES OF AJAX FURNACES, AMONG THEM THE LARGEST SALT BATHS EVER INSTALLED.)

NEUTRAL HARDENING ALLOY STEEL PARTS

The exclusive Ajax self-heating, self-circulating electrode principle insures even heat transfer at all points. This, with critical temperature control always to within 5° with no overshooting, eliminates distortion. Salt baths do prevent decarburization and 'atmospheric' reactions by sealing off *all* atmosphere, especially important when hardening alloy steel parts such as cylinder sleeves, gears, engine, supercharger, and propeller components, ordnance, wing hinges, bearings . . .

CARBURIZING AND CYANIDE HARDENING

From armor plate with deepest case to smallest cyanided wearing parts, Ajax furnaces are used by the scores in the aviation industries.

HIGH SPEED STEEL TOOLS AND DIES FOR MACHINING

Specific reasons why the country's high production plants use Ajax-Hultgren furnaces are: The method eliminates scaling, oxidation, decarburization, or other surface defects when treating either the molybdenum, tungsten or cobalt types of steel. Moreover, the life of tools hardened in an Ajax furnace is increased 25 to 300 per cent over previously conventional means.

MAINTENANCE COSTS AT THE VANISHING POINT

Ajax salt bath furnaces show a lower overall operating cost than gas or oil-fired equipment. Hundreds of these furnaces are in use for heat treating aluminum—reports show no electrode or pot failure in 7 years! Maintenance costs, always low, are now at the vanishing point. GET CATALOG 107-A OR BULLETIN 110 FOR DETAILS.

AJAX ELECTRIC CO., INC., FRANKFORD AVE. AT DELAWARE AVE., PHILA. 23, PA.

THERE'S AN AJAX INSTALLATION NEAR YOU!

THE AJAX HULTGREN ELECTRIC SALT BATH FURNACE

ASSOCIATE COMPANIES:

AJAX METAL COMPANY, *Non-Ferrous Ingot Metals and Alloys for Foundry Use*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup High Frequency Induction Furnaces*
AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ENGINEERING CORPORATION, *Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces*

Beneath the Surface—

go STANDARD forgings and castings

ARMY E NAVY

And, beneath the surface of these Standard steel products lie the hidden qualities on which the men who man the subs depend.

Acid open hearth steel, rigidly controlled through every phase of manufacture, imparts to Standard forgings the high physical properties that mean long service life in peacetime industry and may mean life itself in time of war.

STANDARD STEEL WORKS
DIVISION OF
THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

FORGINGS • CASTINGS • WELDLESS RINGS • STEEL WHEELS

it made, or repairs or alters it at the request of the purchaser of the castings, and the pattern is owned by the purchaser, it is a sale of a pattern, or the repair or alteration of a pattern; such a sale does not come within Regulation No. 235 and a charge may be made in addition to the maximum prices for the sale of the castings. The sale of the pattern is a sale of foundry equipment subject to Regulation No. 136 (Machines and Parts, Machinery Services).

(b) Where the producer owns the pattern, no extra charge may be made in addition to the maximum prices for the making or repairing of the pattern. Where an alteration is performed on a producer's pattern for a standard casting (for use in producing a special casting) and the producer later will restore the pattern to the original form, the alteration is, in effect, the sale of a service to the purchaser. Such a sale does not come within Regulation No. 235, and a charge may be made in addition to the maximum price for the sale of the casting. The sale of the service is subject to Regulation No. 136.

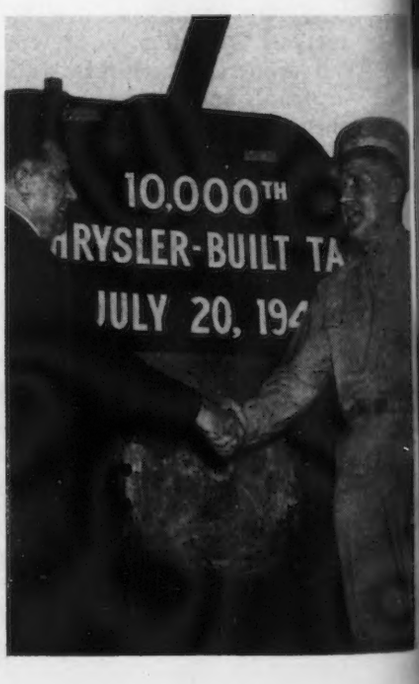
MPR No. 241 — Malleable Iron Castings

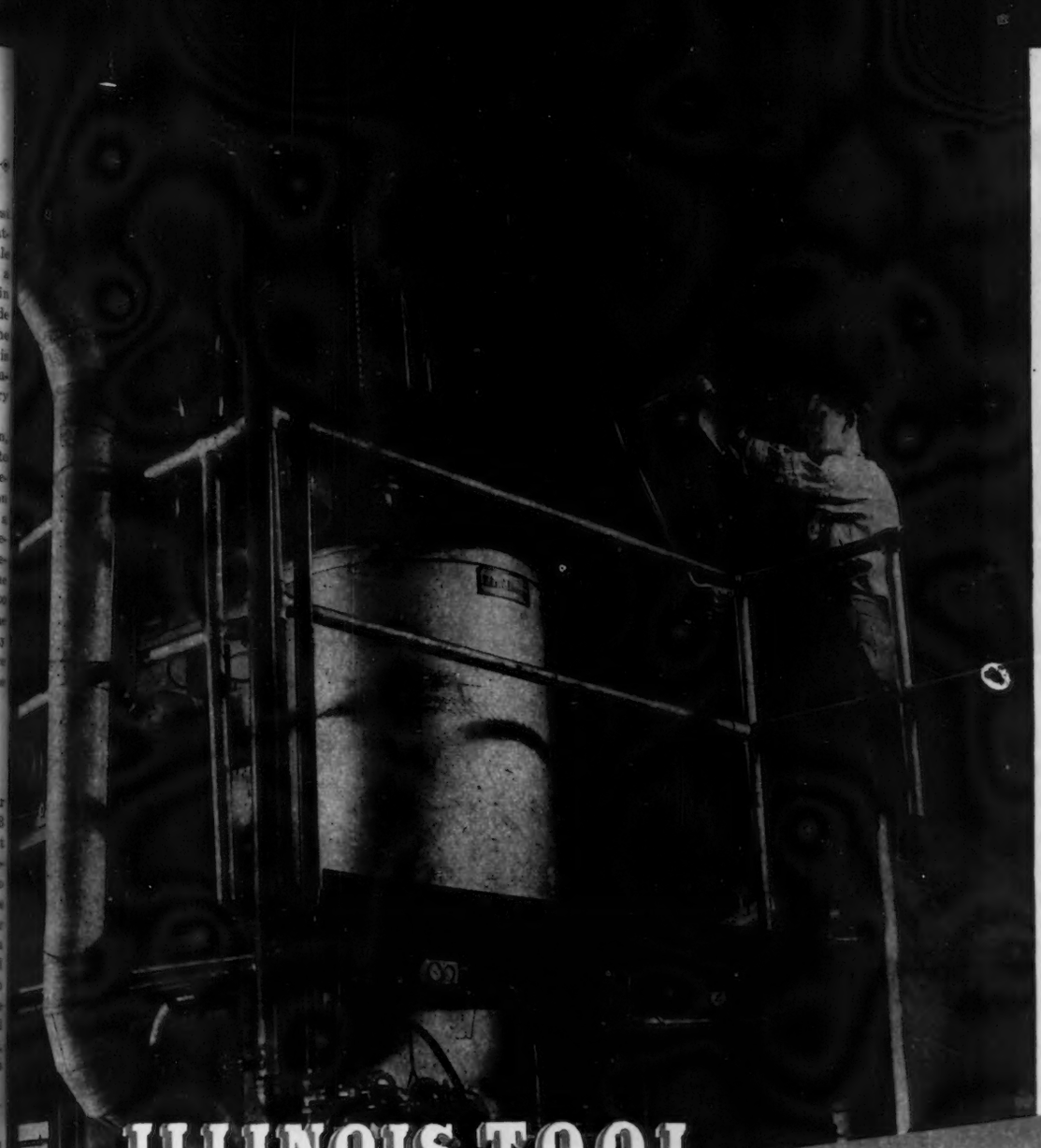
Price Determination

Change from special formula to regular formula in pricing castings. Company B entered into a cost-plus contract with W about three years ago. The contract is for a five-year period, and provides that prices are to be adjusted monthly so that B's profits on the casting sold each month would be 3½ per cent. Company B also has a pricing formula for other customers, in which profit is figured at an average of 15 per cent of cost. Both formula were filed by B with OPA. The formula for sales to W computes overhead rates and cost of materials at October, 1941, levels, whereas the other formula computes

---

ONE OF A SERIES: The 10,000th Chrysler-built medium tank rolled off the assembly lines of the Detroit Tank Arsenal recently, amid befitting ceremonies. Gen. J. K. Christmas, famous Army tank expert, congratulates E. J. Hunt, manager of the arsenal.





VITAL TO TOOL EFFICIENCY

Broaches being lowered into the furnace for tempering.

ILLINOIS TOOL HEAT TREATING

● Modern facilities, technical skill and practical experience in the application of heat contribute greatly to the outstanding performance of Illinite cutting tools. Through precisely controlled heat treatment, each tool is rendered structurally strong, permanently accurate and able to give exceptionally long service. These effective qualities, which asssure increased economy and efficiency in production, are important reasons for calling in "Illinois Tool."

OVERNIGHT TO ALL AMERICA
FROM THE HUB OF AIR TRANSPORTATION

ARMY E NAVY

ILLINOIS TOOL WORKS

MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

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In Canada: Canada Illinois Tools, Ltd. Toronto, Ontario

ILLINITE { HOBS • BROACHES • SHAPER CUTTERS • GEAR CUTTERS
MILLING CUTTERS • GROUND FORM TOOLS • SPECIAL TOOLS

You get accurate, dependable results and SAVE A LOT OF MONEY —with the Delta Carbide Tool Grinder . . .

This low-cost grinder runs absolutely true, free from vibration — for delicate grinding of carbide tipped tools.

Manufactured by modern precision methods in a modern plant, this sturdy, vibrationless Delta Carbide Tool Grinder is so well-built, so accurately machined that you can depend on especially fine results.

It is so low in cost that it can be used profitably in *any* shop — large or small. Combined with the Delta standard tool grinder for hogging down the shank steel, it gives you a perfect working combination for sharpening tungsten carbide tools, with a remarkably small initial investment.

Many outstanding features to assure accuracy and long life

Motor of reversible type; equipped with self-sealed ball bearings which never require lubrication. Manually-operated brakes on each wheel. One 60-grit and one 120-grit wheel; surface speed 5200 f.p.m. Grinder also takes standard diamond wheels; has convenient water pot. Heavy, accurately ground tables. Entire sub-base quickly, easily removed for cleaning out sludge.

DELTA MILWAUKEE Machine Tools

Widely used in war plants, this good-looking, modern machine has made a record for itself wherever it has been installed. Get credit for discovering the low-cost Delta way in *your* plant. Investigate! Send for the new Delta catalog today.

M-2B

TEAR OUT AND MAIL THIS COUPON

Reversing Switch Conveniently located at front of grinder. Six-pole type, completely wired into the unit. Opens both sides of line.

THE DELTA MANUFACTURING CO.
704H E. Vienna Ave., Milwaukee 1, Wis.

Please send me your new catalog giving full details on the Delta Carbide Tool Grinder and your full line of low-cost machine tools.

Name.....Position.....

Company.....

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these items at the higher rates permitted in the Regulation. Company B wishes to discontinue the special W formula, and to use its regular formula when selling castings to W. However, each month B will adjust its prices to W down to the 3½ per cent profit margin as specified in the W contract, but will not adjust up to the 3½ per cent profit margin where use of its regular formula will not yield 3½ profit. Company B may change to its regular formula in pricing castings sold to W, with the limitation as to profit margins indicated, if, but only if, the type of castings sold to W is of such a nature that the use of the overhead rates for the other customers would not distort costs and prices to W.

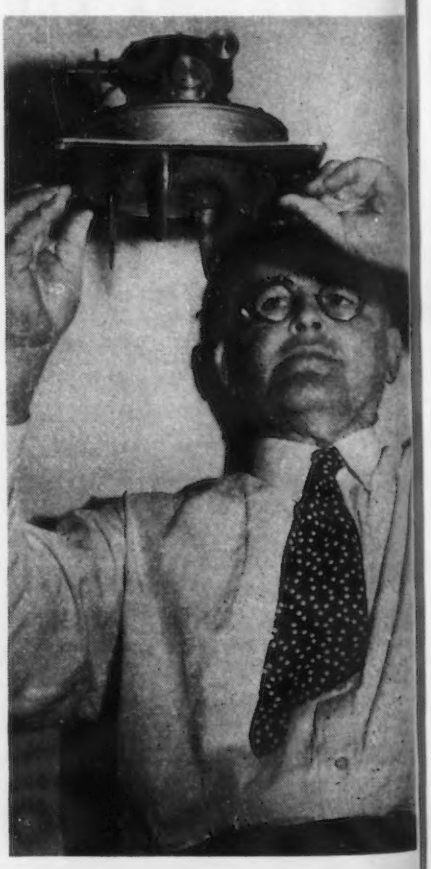
MPR No. 244 — Gray Iron Castings

Price Determination

Contracts of sale establishing maximum prices. The following situations involve determination of the existence of contracts of sale establishing maximum prices under Section 1421.166 (a):

(a) A long term contract to sell is entered into prior to the base period. Thereafter, during the base period, deliveries of castings are made pursuant to this contract. Even though title to the castings passes during the base period, and in a sense, therefore, "contracts of sale" under Section 1421.164 (a) (10), may be said to have been entered into, OPA does

NEW PROPELLER FOR U. S.: A ship's propeller which will steer as well as propel, move a vessel in any direction, and enable it to turn without forward motion, was demonstrated recently to the Navy and Maritime Commission. The device is the Voith-Schneider propeller, an Austrian invention. W. W. Rutland, New York shipping expert, holds a model of the propeller.



Lukens 206" Mill, World's Largest Plate Mill, which can roll ingots weighing up to 110,000 lbs., and produce steel plates up to 195" in width or up to 25" in thickness.

To facilitate service to West Coast Industry

Lukens Steel Company

Sheared and Universal Mill Carbon and Alloy Steel Plates in the widest range of gauges and widths available from any single source — from 8" up to 195" in width, and from 3/16" up to 25" in thickness. Spun and pressed heads of all types, and other products pressed from steel plate.

By-Products Steel Corp.

Specialists in the production of parts made from steel plate by means of shearing, blanking, flame-cutting, bending and pressing.

Lukenweld, Inc.

Designers and fabricators of welded steel plate structures for use in the construction of various types of industrial machinery and equipment.

have appointed

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Telephones: Garfield 9206 and 9207

628 Security Title Insurance Building
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Telephones: Vandike 1151 and 1152

6115-6116-6117 Arcade Building
1319 Second Avenue
SEATTLE 1, WASH.
Telephones: Main 4377 and 4378

LUKENS STEEL COMPANY & SUBSIDIARIES: BY-PRODUCTS STEEL CORP. AND LUKENWELD, INC., COATESVILLE, PA.

not regard the prices at which these deliveries were made during the base period as maximum prices under Section 1421.166 (a).

Note: In this situation, if there was no contract to sell made prior to the base period and, therefore, if the seller was not bound to deliver and the buyer to accept delivery, the deliveries made during the base period or the acceptance of orders during the base period without actual deliveries being made would establish maximum prices under Section 1421.166 (a).

(b) In the second situation, a bilateral contract is entered into during the base period in which the seller promises to sell and the buyer promises to buy. Even though no deliveries are made and title to castings does not pass during the base period, this contract to sell establishes maximum prices under Section 1421.166 (a).

(c) In the third situation, a unilateral contract is entered into during the base period which is effectuated, for example, by the seller's delivery of castings pursuant to the buyer's offer to buy. Even though no contract to sell is entered into, a contract of sale has been made and, therefore, this is a maximum-price-determining contract under Section 1421.166 (a).

(d) In the fourth situation, the parties enter into contracts to sell and also had contracts of sale during the base period. Here, of course, the contracts would be maximum-price-determining contracts under Section 1421.166 (a).

MPR No. 136 — Machines and Parts

Applicability

Transfer of security interest in machinery-locomotives. A bank purchased three locomotives from the manufacturer, and transferred them to a railroad, under a lease-with-option-to-buy. The bank's interest in the locomotives was transferred to a Federal agency. This transfer was not subject to Regulation No. 136, since it was not a sale or delivery of the locomotives but only a transfer of the bank's security interest in the locomotives coupled with its rights under the lease.

Steel scaffolding. The Regulation applies to the rental of steel scaffolding equipped with hoists, since "hoists" are listed in Appendix A (d); if the scaffolding is not equipped with hoists, the General Maximum Price Regulation applies.

Used shafting. The sale of used line shaft with attachments to be used for industrial power transmission, is subject to Regulation No. 136; Regulation No. 310 (Reusable Structural Steel Shapes and Plates, and Shafting) applies to the sale of a used line shaft, if reusable, and if stripped of all attachments.

PS No. 49 — Resale of Iron or Steel

Price Determination

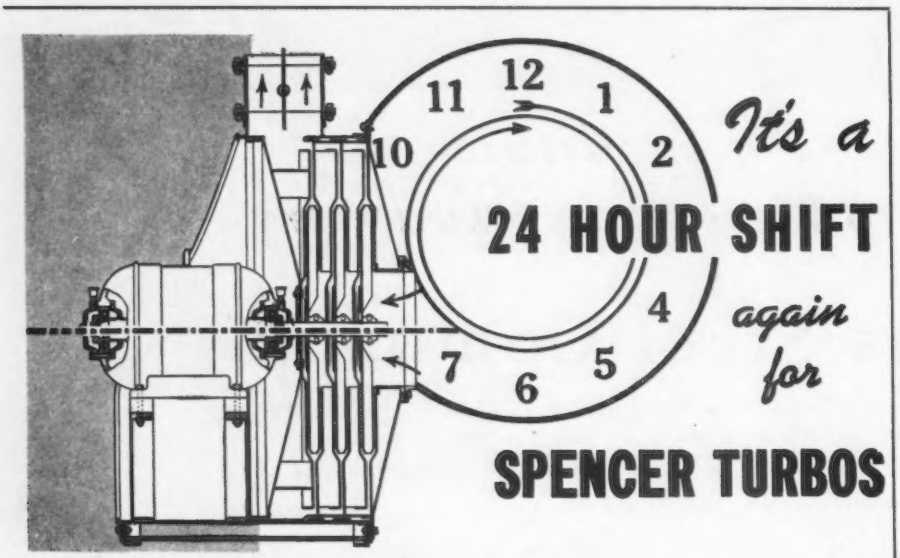
Warehouse sales—transportation charges. Where the truck rate is higher than the less-than-carload rail rate and a customer insists upon shipment by truck, the warehouse may not add to the maximum price the difference between the rail and the truck rate.

Where less-than-carload shipments must now be handled at the higher rate for railroad pick-up and delivery service, the additional cost of delivery must be absorbed by the warehouse out of its margin.

MPR No. 147 — Bolts, Nuts, Screws

Applicability

Sales by wholesaler and distributor. In general, sales of bolts, nuts, screws and rivets by wholesalers or distributors are subject to the General Maximum Price Regulation. However, where a wholesaler or distributor purchases these products from a manufacturer and receives a discount thereon which discount customarily was or would have been given by one manufacturer to another manufacturer between Oct. 1 and 15, 1941, Regulation No. 147 is applicable to resales by this wholesaler or distributor of the products on which he received such discount.



And Spencer Turbo-Compressors are standing the gaff just as they did in the last war, the post-war boom, and all emergencies during the past third of a century.

WHAT ARE THE LIMITATIONS? Frankly we don't know how long a Spencer Turbo will last because many of the early models are still in service.

We do know that the wide clearances, low peripheral speeds, large bearings and all metal construction with bridge type support are the features that make reliable continuous heavy duty service possible.

SUGGESTIONS FOR ALL-OUT PERFORMANCE

Keep Them Well-Lubricated. It only takes a minute, and the bearings are the only parts that can wear.

Use Blast Gates. Even when rotating the Spencer uses little power when the blast gate is shut off.

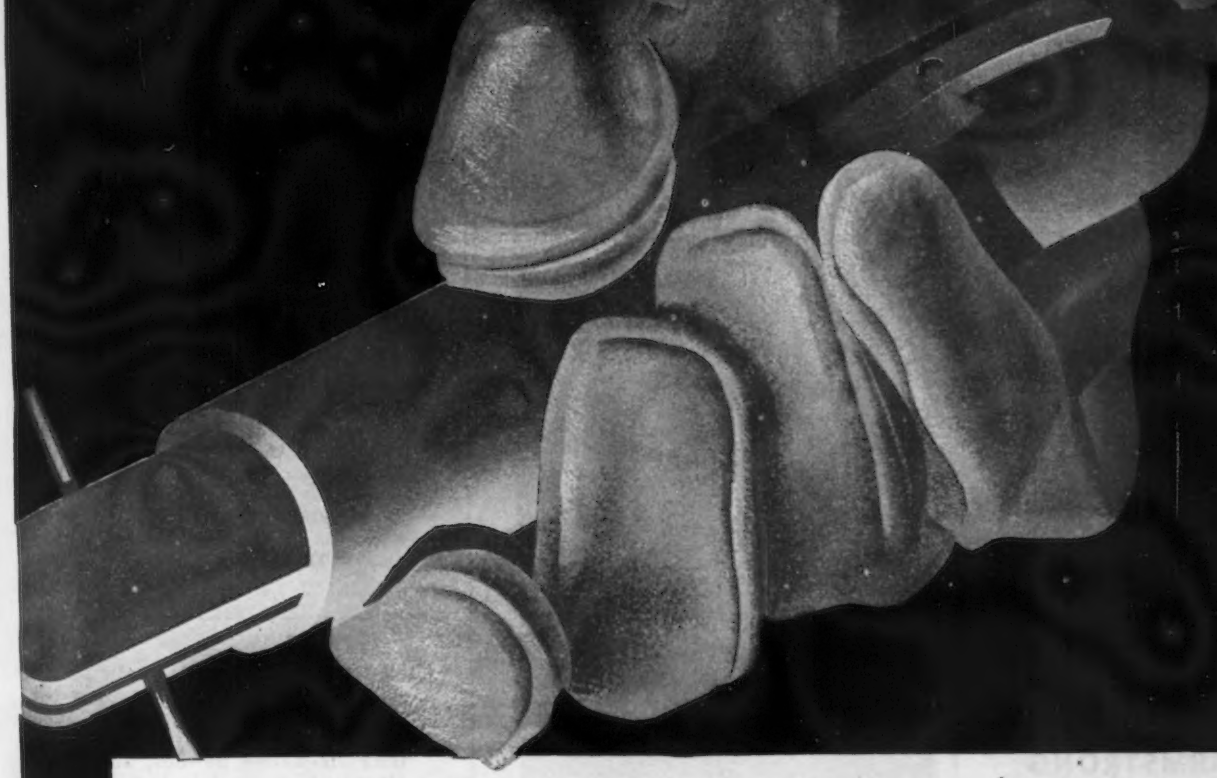
Get Acid Proof, gas tight, or overhung or outboard special models if you need them. The standard models are rust resisting throughout.

Get the Spencer Data Book which shows how to figure to get more out of your air supply.

THE SPENCER TURBINE COMPANY
HARTFORD, CONN. 247A

"I get awfully tired hearing you two talk shop every meal."

RACO TYPE D GIVES A TENSILE STRENGTH OF 60,000 LBS. PER SQ. IN.



Instead of wondering where and when you can get Shielded Arc Electrodes . . . why not try RACO Type D Composite Electrodes?

RACO Type D has been used for over ten years by the largest automobile manufacturers . . . on hundreds of jobs . . . both automatic and manual . . . where high speed is vitally important and high stress is not a factor.

But tests have proved that a tensile strength of 60,000 pounds per square inch is obtainable with RACO Type D Composite Electrodes . . . far more than is required for most sheet metal work . . . and more than sufficient for many types of general welding of mild steel for storage tanks, range boilers and similar purposes.

The **REID-AVERY COMPANY**

DUNDALK, BALTIMORE 22, MARYLAND

RACO SHIELDED ARC ELECTRODES

We are accepting orders for deferred delivery on:

RACO TYPE H-D No. 5 for deep groove welding in flat position AC or DC

RACO TYPE H-D No. 6 for fillets flat and positioned machine and plate construction AC or DC

RACO TYPE H-D No. 7 for all position, general construction—shipbuilding. DC Reverse Polarity

RACO TYPE H-D No. 8 for all position, general purpose, single pass, building up wearing surfaces, low carbon. DC Straight Polarity or AC

Samples and Literature on Request

WPB Issues New Personnel List

●●●**With the announcement** by WPB's chairman, Donald M. Nelson, that the reorganization of the War Production Board had been completed this new list of WPB personnel was made available. The telephone numbers given in the extreme right hand column are extensions of REpublic 7500 and the initials following room numbers are abbreviations of building names, such as SSB for Social Security Building.

EXECUTIVE OFFICE OF CHAIRMAN

	Tel. Ext.
Chairman, Donald M. Nelson, rm 5055 SSB	**2113**
Asst. to Chairman:	
E. A. Locke, Jr., rm 5036 SSB	2585
A. C. C. Hill, Jr., rm 5036 SSB	3384
Donald Nicholson, rm 5411 SSB	74435
David M. Noyes, rm 5416 SSB	78405
Special Assts. to Chairman:	
Morris Creditor, rm 5055 SSB	72883
G. Keith Funston, rm 5055 SSB	2107
Exec. Sec., Lyle Belsley, rm 5518 SSB	**2233**
Asst. Exec. Sec., Frederick Roe, rm 5518 SSB	2234
Office of Gen. Counsel:	
Gen. Counsel, John Lord O'Brian, rm 5517 SSB	2221
Solicitor of WPB (to be appointed)	
Office of Rubber Director:	
Dir., William M. Jeffers, rm 5014 MCB	3256
Office of Vice-Chm. Civilian Requirements:	
Vice-Chm., Arthur D. Whiteside, rm 5037 SSB	75701
Wholesale and Retail Trade Div. Dir.:	
Kenneth M. Keef, N. Y. City, Columbian Carbon Bldg.	Murray Hill 3-6805
Office of Vice-Chm. on Smaller War Plants Corp.:	
Vice-Chm., Brig. Gen. Robert W. Johnson, rm 316 HOLC	72317

NOTE: Chart showing personnel of WPB Steel Division appears elsewhere in this issue.

OFFICE OF WAR UTILITIES

Dir., J. A. Krug, rm 5300 SSB	74642
Power Div., Dir., B. J. Sickler, rm 2085 TR	2374
Manufactured Gas Div., Dir., Alexander Macomber, rm 2630 TR	6434
Natural Gas Div., Dir., Paul R. Taylor, rm 2079 TR	2576
Water Div., Dir., Arthur Gorman, rm 2077 TR	5949

POWDER PILL: A bitter pill for the Axis is Ball-powder, a new explosive produced chemically under water. It is made five times faster than smokeless powder, and it has already been used in battle.

"ALL-OUT" means ALL ARMSTRONG

With the correct ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers you are tooled-up for all-out production. With ARMSTRONG TOOL HOLDERS you are ready to start work with the selection of a cutter and the tightening of a set screw.

With ARMSTRONG TOOL HOLDERS you can step-up speeds and feeds for they will stand up to any cut a machine tool can "pull"—will cut efficiently at speeds and feeds far above those generally practiced as "standard".

With ARMSTRONG TOOL HOLDERS you will reduce the high speed steel requirements for any operation 90%—for in an ARMSTRONG TOOL HOLDER an ounce of high speed steel will do the work requiring 10 ounces in a forged tool.

With ARMSTRONG TOOL HOLDERS you will be tooled-up "for the duration" and for the change-over to peacetime production after the war because each is a permanent multi-purpose tool—a basic tool wherever metal is to be machined.

ARMSTRONG BROS. TOOL CO.

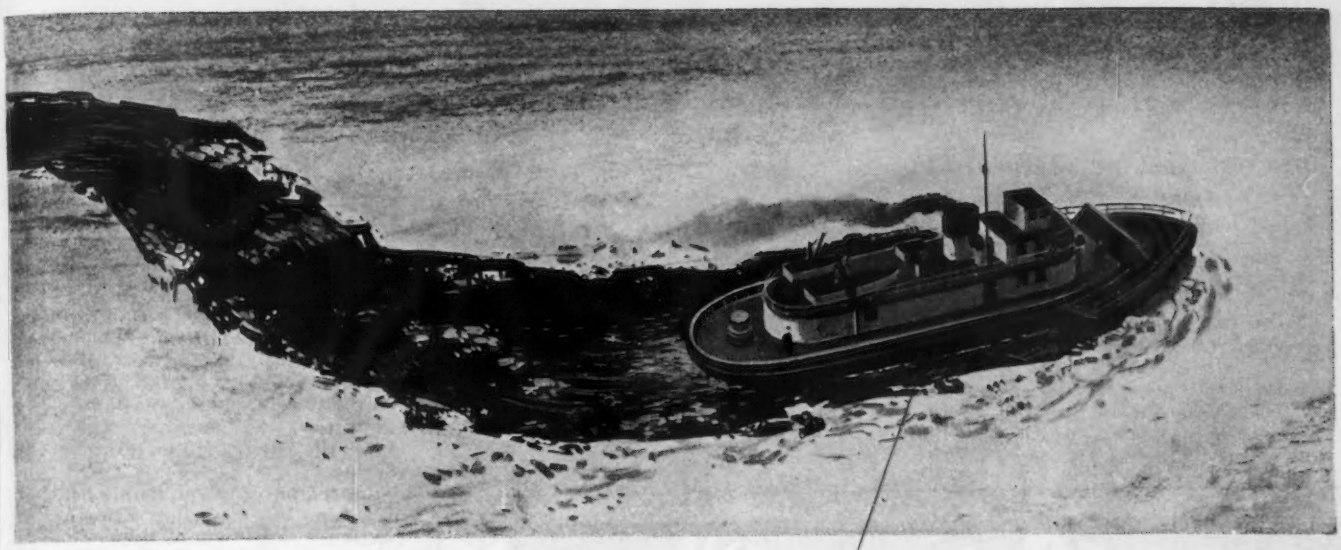
"The Tool Holder People"

309 N. Francisco Ave Chicago, U. S. A.

Buy ARMSTRONG TOOLS from your Supply House

Eastern Warehouse & Sales:
199 Lafayette St., New York

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



This W·A·B remote control installation opens new channels of *product improvement* too . . .

How well W·A·B Remote Control equipment might serve on *your* product or production machinery is best demonstrated by the variety of complex jobs it is already doing.

Take this Ice Breaker, for instance. All the operations involved in maneuvering the engines . . . speed control, clutching or declutching, braking, and reversing . . . are governed by five or six inches of travel of two small handles, a hand's-breadth apart on the control stand. An easy, back-and-forth movement of another handle actuates the rudders. The dependability and responsiveness of the controls were picturesquely summed up by the operator, when he said, "I could write my name in the ice with this ship."

If you manufacture any mechanical device where a cycle or series of operations are controlled from some central point . . . or if in your plant there is need for some similar control . . . the chances are that W·A·B Remote Control Systems will do the job better, easier, and at less cost. In many instances standard, "off the shelf" W·A·B devices, immediately available, are all that are required. If you will outline your control problem, one of our representatives will be glad to make recommendations. Write, wire or phone.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

General Offices: Wilmerding, Pa.

74 Years of Pneumatic Control Experience

W·A·B

PNEUMATIC
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Contr. of Shipbuilding, W. F. Gibbs, rm 4300 SSB	2231
Production Exec. Comm., Chm., Charles E. Wilson, rm 5055 SSB	2134
Industrial Facility Comm., Chm., William B. Murphy, rm 2607 RRB	3304
Non-Industrial Facility Comm., Chm., Frank W. Herring, rm 4280 SSB	6788
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Administrative Asst. to the Chm., Bernard L. Gladieux, rm 5413 SSB	73601
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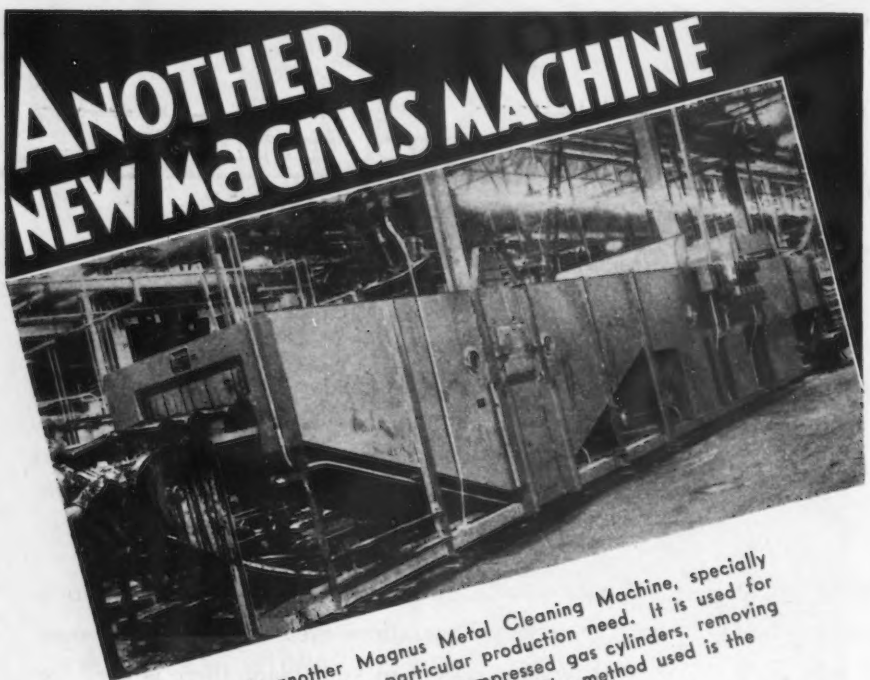
Success Is Greater In Filling Pores

Buffalo

• • • Porous magnesium castings formerly rejected because their use in airplane engines permitted seepages of oil through the metal are reported to be having their pores filled so satisfactorily at the Chevrolet Division plants in Buffalo they now are declared to be about the equal of finer-grained castings.

Impregnation is accomplished with tung oil or sodium silicate. Castings are completely degreased in a chloroform bath and placed in one of three batteries of tanks. The air in the tanks is exhausted to create a vacuum which removes all air in the pores of the casting. Then tung oil is forced into the pores under a pressure of 200 psi. When the oil sets, it forms a hard resinous compound.

ANOTHER NEW Magnus MACHINE



Here's another Magnus Metal Cleaning Machine, specially designed to meet a particular production need. It is used for cleaning between draws of compressed gas cylinders, removing drawing lubricant before annealing. The method used is the

MAGNUS EMULSO-DIP METHOD

and the machine was designed to put this new and effective cleaning process on a completely automatic basis.

The work is first dipped in the Emulso-Dip solution, then drained as it travels to the spray zone where it is flushed clean with water. A final alkaline spray and hot water rinse delivers cylinders in perfect shape for annealing and the succeeding draws.

Do you want to end bottlenecks in your production line due to interrupted flow of metal units in manual cleaning or finishing operations? Ask us to help you, not only with a suitably designed machine for automatic handling, but with improved methods and more suitable cleaning materials.

NEW! The first complete manual on metal finishing and cleaning, covering methods, materials and machines. WRITE FOR YOUR COPY.

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Aluminum & Magnesium Div., Dir., A. H. Bunker, rm 2003 TR	2257
War Prod. Drive Div., Dir., Theo. K. Quinn, rm 3134 MCB	74092

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Vice-Chm., Joseph D. Keenan, rm 5056 SSB	2241

VICE-CHAIRMAN FOR MANPOWER REQUIREMENTS

Vice-Chm., Clinton S. Golden, rm 5233 SSB	3301

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(International Supply)

Vice-Chm., William L. Batt, rm 5077 SSB	2212
Joint War Prod. Comm.—U. S. and Canada, Chm., Charles E. Wilson, rm 5055 SSB	2134
Combined Raw Materials Board, U. S. Member, William L. Batt, rm 5077 SSB	2212
Combined Production & Resources Board, U. S. Member, Donald M. Nelson, rm 5055 SSB	2113
Exec. Dir. (to be appointed)	71211
U. S. Exec. Officer (to be appointed)	2041
U. S.-Canadian Materials Coordinating Comm., U. S., William L. Batt, rm 5077 SSB	2212

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Production Resources Div., Dir., J. B. Campbell, rm 2609 RRB	73376
Progress & Scheduling Div., Dir., W. E. Mullestein, rm 4242 SSB	3201
Office of Prod. Research & Devel., Dir., Dr. Harvey N. Davis, 420 5th Street, N. W.	76176
Planning & Statistics Bur., Dir., Stacy May, rm 5700 SSB	2410

★ Just a little more than one year ago we were awarded the Navy "E" Burgee as a result of the tireless effort of "AUTOMATIC" employees in the continued production of equipment essential to the war effort.

Our organization, loyal to the core, has kept up the pace set when Uncle Sam first called for all out production.

So now, for the third time "AUTOMATIC" employees have won the Navy Production Award for meritorious service on the industrial field of battle.

The SECOND SILVER STAR has been placed on the Navy "E" Burgee we so proudly fly.

We'll keep it up—that is the spirit that prevails at "AUTOMATIC." Here we are all dedicated to the task of producing more and producing on time.

MANUFACTURERS FOR OVER 35 YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AUTOMATIC TRANSPORTATION CO.

75 WEST 87th STREET DIV. OF THE YALE & TOWNE MFG. CO. CHICAGO, ILLINOIS

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Planning Div., Dir., Simon Kuznets, rm 5713 SSB	76372
Statistics Div., Dir., Stacy May, rm 5700 SSB	2410
Procurement Policy Div., Acting Dir., Tudor Bowen, rm 4515 SSB	2251
Resources Protection Bd., chn., Mahlon E. Simpson, rm 2094 RRB	2746

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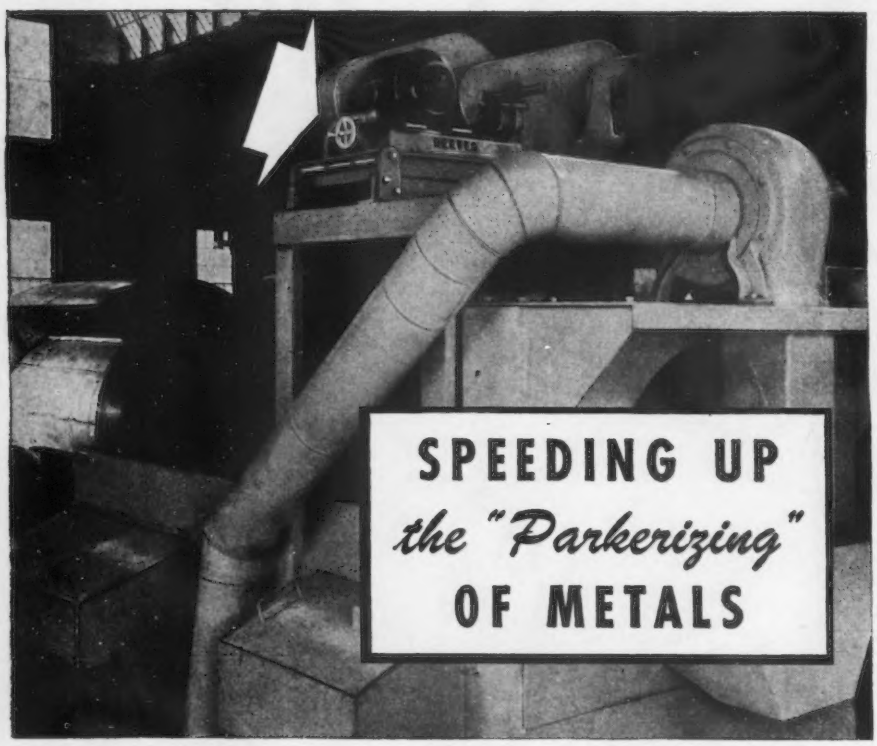
Requirements Comm., Chm., J. A. Krug, rm 5300 SSB	74642
Program Bur., Dir., Charles E. Kohlhepp, rm 5311 SSB	73007
Non-Military Div., Dir., Melvin G. de Chazeau, rm 5319	6632
Military Div., Dir., Bertrand Fox, 5318 SSB	3481
Urgency Rating Div., Acting Dir., George N. McClusky, rm 5324 SSB	2448
Foreign Div., Dir., E. A. Peyser, rm 5330 SSB	4387
Stockpiling & Transportation Div., Dir., Dr. William Y. Elliott, rm 2653 SSB	73392
Production Controls Bur., Dir., Harold J. Boeschenstein, rm 3006 RRB	**74683**
CMP Div., Dir., W. C. Skuce, rm 3006 RRB	74685
Production Sched. Div., Dir., Robert Hatfield, rm 3024 RRB	76107
Inventory Policy Div. (to be appointed)	
Distribution Bur., Dir., William John Logan, rm 3042 RRB	**76092**
Compliance Div., Dir., M. S. Verner, H-203, TEMPO E	
Controller Div., Dir., David Novick, rm 3058 RRB	2509
Canadian Div., Acting Dir., Hugh Porter, 3310 RRB	5505
Priorities Control Div., Acting Dir., William John Logan, rm 3042 RRB	76092
Orders & Reg. Bur., Dir., Thomas C. Blaisdell, Jr., rm 3034 RRB	**71288**
Appeals Div., Dir., Dr. Arthur N. Holcombe, rm 1117 MCB	71927
Order Clearance Div., Dir., Hugh Jackson, rm 3026 RRB	71771

OFFICE OF OPERATIONS VICE-CHAIRMAN

Operations Vice-Chm., Hiland G. Batcheller, rm 5006 RRB	**3394**
Deputy Vice-Chm. for Industry Operations, John Hall, rm 4006 RRB	2262
Asst. Deputy Vice-Chm. Industry Oper., John P. Gregg, rm 4006 RRB	2264
Deputy Vice-Chm. Field Oper., Wade T. Childress, rm 5018 RRB	3504
Asst. Deputy Vice-Chm. Field Oper., Distrib. Bu. Liaison, J. W. Peters, rm 5042 RRB	76002
Asst. Deputy Vice-Chm. Field Oper., Harcourt Amory, rm 5040 RRB	72092
Chief of Territorial Poss., Gordon W. Foote, rm 5036 RRB	72491
Field Admin. Br. Chief, Ralph N. Stohl, rm 5314 RRB	2218
Field Contact Br. Chief, Samuel L. Shober, Jr., rm 5231 RRB	2553
Materials Officer, Joseph E. Adams, rm 5224 RRB	3504
Orders Officer, J. B. Walker, Jr., rm 4114 RRB	3175



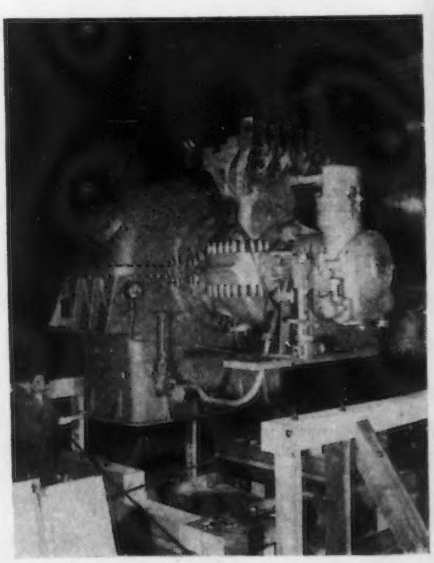
REEVES-DRIVEN RANSOHOFF EQUIPMENT ELIMINATES FEEDING OF WORK MANUALLY

New speed and efficiency in protecting metals from corrosion are secured with this Continuous Drum Type Parkerizing Unit, manufactured by N. Ransohoff, Inc., Cincinnati, O., which eliminates feeding work manually through various steps. For proper handling of different sizes and shapes, speed of rotating drum is varied exactly as needed through a REEVES Vari-Speed Motor Pulley with countershaft. Any drum speed from 2/3 r.p.m. to 2 r.p.m. is available by this installation merely by turning a handwheel. REEVES Variable Speed Drives improve the performance of all types of driven machines. Wide range of sizes, types, speed ratios to choose from—Transmissions, Motor Pulleys, Motodrives. Send for copy of 16-page Booklet I-423, "More Output for Victory." No obligation.

REEVES PULLEY CO., COLUMBUS, INDIANA

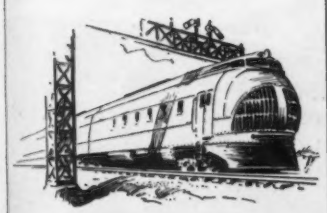
REEVES SPEED CONTROL

TROOPSHIP TURBINE: This propulsion turbine being lowered onto a flat car for shipment from General Electric's Schenectady Works is one of a number of such units which the company is making for new type troopships being built.

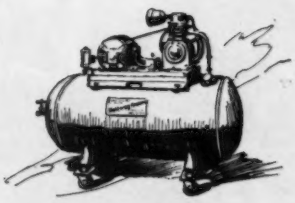


ARE PARTS A PROBLEM?

Consider BRAKE SHOE *as a Source*

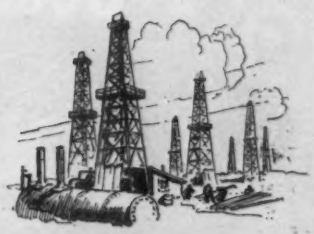


Parts for Trains



Equipment for Garages

Parts for Excavating

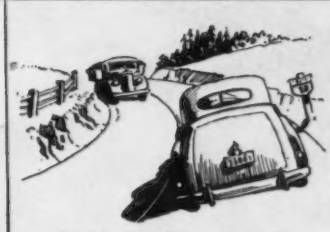


Parts for Oil Drilling

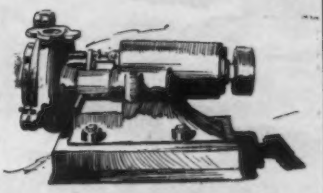
Parts for Planes

Parts in metals, metal alloys and composition.

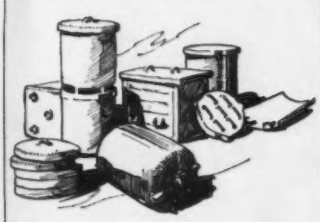
Parts that are cast, upset, drop forged and molded.



Parts for Cars, Trucks

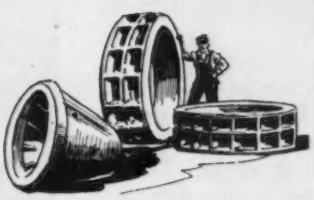


Industrial Pumps



Parts for Heat Treating

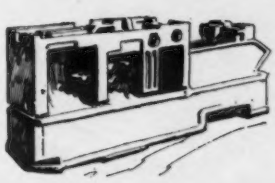
Parts for Ships



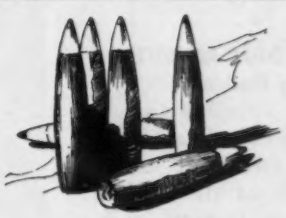
Parts for Crushers

To a manufacturer there just isn't any such thing as an unimportant part, for a piece of equipment is only as good as its weakest part. Knowing this, BRAKE SHOE *engineers* the parts it makes for its customers.

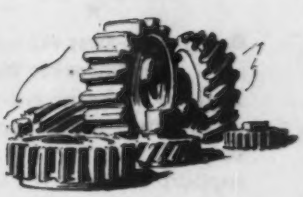
What would closer tolerances in the parts you buy mean in your machine shop costs?



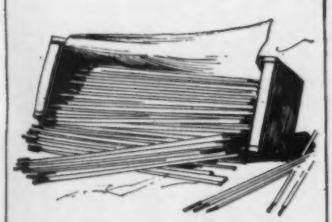
Parts for Machinery



Parts for Shells



Parts for Manufacturers



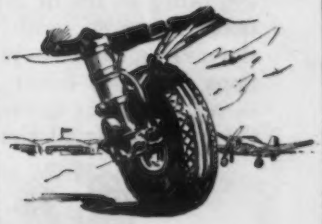
Products for Welding

AMERICAN BRAKE SHOE COMPANY, 230 PARK AVE., NEW YORK 17, N. Y.

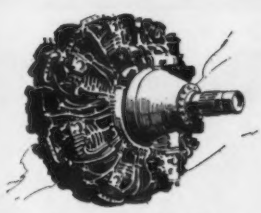
AMERICAN Brake Shoe COMPANY

58 PLANTS SERVING INDUSTRY AND TRANSPORTATION

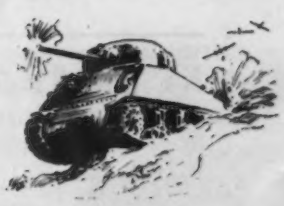
American Brakeblok Division	Detroit, Mich.
Ramapo Ajax Division	New York, N. Y.
American Manganese Steel Division	Chicago Heights, Ill.
Brake Shoe & Castings Division	New York, N. Y.
Kellogg Division	Rochester, N. Y.
American Forge Division	Chicago, Ill.
Southern Wheel Division	New York, N. Y.
National Bearing Metals Corp.	St. Louis, Mo.



Parts for Landing Gears



Parts for Aircraft Engines



Parts for Tanks

Streaking through the water at speeds of 60 miles an hour, PT Boats pack more speed and hitting power for their size than any other naval craft afloat. Their capacity to deal death and destruction — like a thunderbolt — makes them one of Uncle Sam's most feared killers of the sea.

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Double Over-Arms Provide a DUAL ADVANTAGE in Milwaukee Milling Machines

Rigidity and convenience—the Milwaukee double over-arm — scores heavily on both counts . . . No other means of arbor support is quite the equal of the double over-arm in *rigidity* — an indispensable quality in any milling machine.

No other means of arbor support affords quite the same quick and easy access to the milling cutter — just a few simple motions and both cutter and arbor are free — an important convenience to the operator at all times.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE 14, WISCONSIN

Buy Victory
with at least 10% in War Bonds!

Milwaukee MACHINE TOOLS

Let's Put The Scrap Into The *Scrap!*

Turnings, clippings, short ends, worn out or broken tools — all these are valuable as precious scrap for remelting in the production of new steel. Surprising amounts of dormant scrap accumulate in every plant daily — collect it — segregate it. Set up a system for the regular pick-up and handling of this valuable raw material. Remember, it's a war on waste, too, and every bit of scrap collected counts in production for Victory.

18 CAM MILLING METHODS

. . . Described and Explained in this Kearney & Trecker Corporation Bulletin

Machining and milling cams of various types present special problems. This series of articles, reprinted from American Machinist in bulletin form, explains methods of cam milling from the practical shopman's viewpoint.

Many machine setups are illustrated, including working diagrams. Eighteen cam milling methods are described, such as use of the Rotary Table, Dividing Head, Dummy Templets, Rotary Head Milling Machine, etc.

Written by the department of Industrial Research, Kearney & Trecker Corporation, this bulletin will prove valuable to every shopman. Write Dept. CM for your copy.

Buy Victory with at least 10% in War Bonds!

Kearney & Trecker *Products* CORPORATION
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Subsidiary of Kearney & Trecker Corporation

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Office of Industry Advis. Comm., Dir., John C. Whitridge, Jr., rm 4361 SSB	2817
Office of Procedures, Dir., Lawrence M. Shea, rm 2512A RRB	75056
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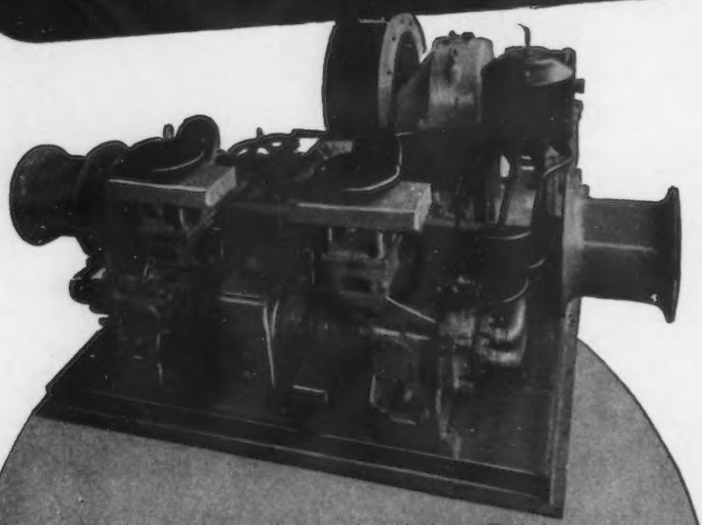
Zinc Div., Dir., James Douglas, rm 3-222 TE	3752

made to "order"



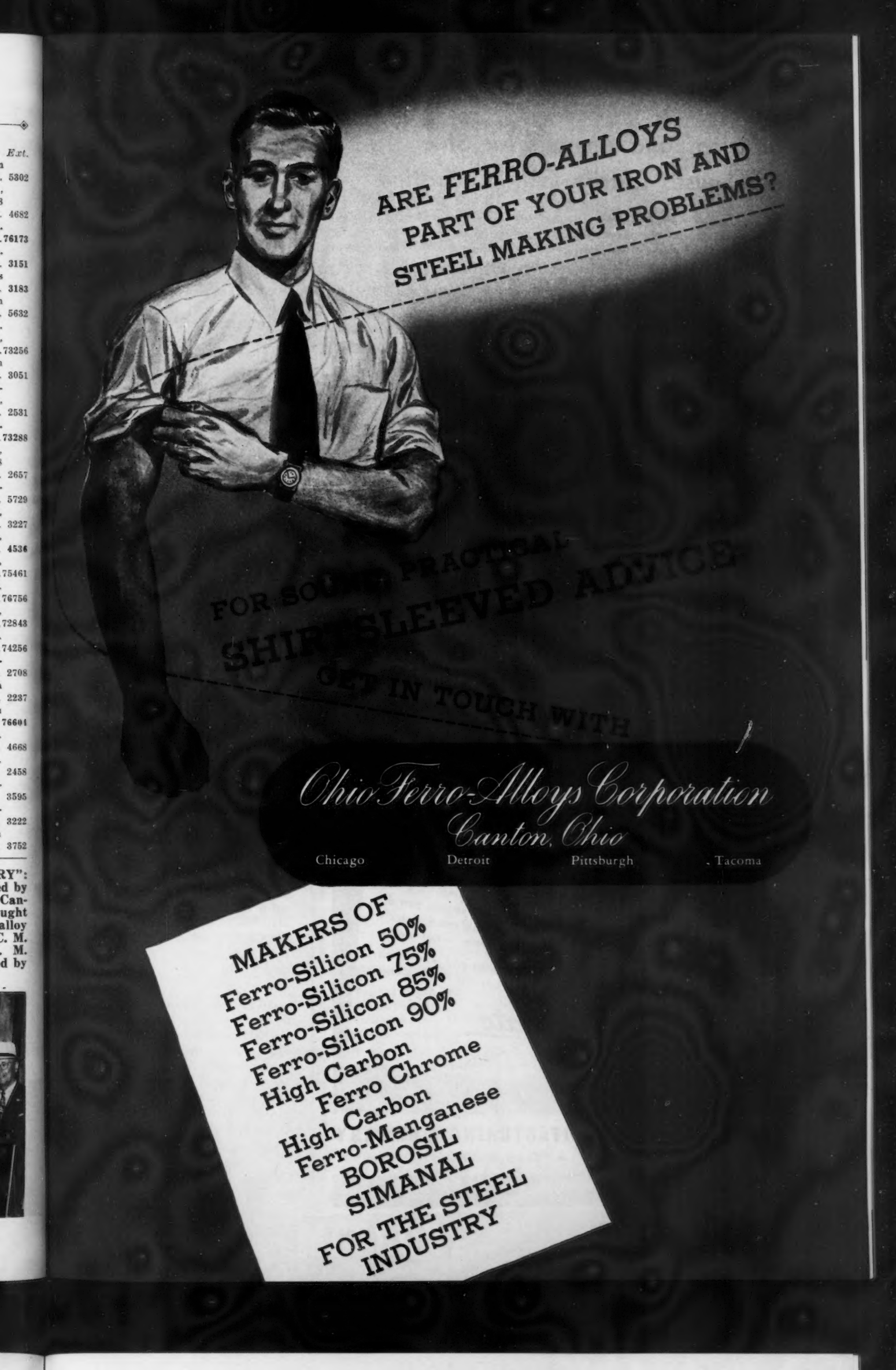
These electro-hydraulic winches are typical of the special hoisting machinery developed and manufactured by BAYARD. They represent just one instance of the many types of naval equipment designed, engineered and furnished by this company to individual specifications.

BAYARD

The coveted Navy "E" Pennant—awarded to Bayard for excellence in fulfilling Naval contracts.

M. L. BAYARD & CO., Inc. • ENGINEERS • MACHINISTS • PHILADELPHIA

"PRODUCTION FOR VICTORY": An eight-day war exhibit staged by Republic Steel Corp. for the Canton-Massillon, Ohio, area, brought three top executives to the alloy steel center. Left to right are C. M. White, R. J. Wysor, and T. M. Girdler. The exhibit was viewed by more than 45,000 people.


ARE FERRO-ALLOYS
PART OF YOUR IRON AND
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FOR SOUND PRACTICAL
SHIRT-SLEEVED ADVICE
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Ferro-Silicon 90%
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Ferro Chrome
High Carbon
Ferro-Manganese
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FOR THE STEEL
INDUSTRY

Questions and Answers for Steel Warehouses Clarify CMP Operation

• • • **The Controlled Materials** Plan has imposed more serious problems on the steel warehouses of the nation than any other branch of steel distribution. With CMP risen to full power July 1 this series of questions and answers on operations under CMP Reg. 4, M-21-b-1 and M-21-b-2 with the use of Form PD-83 (explained) has been developed by the Steel Products Warehouse Association, Inc.

General Preference Order M-21-b-1

• May a steel warehouse use the CMP Regulation No. 7 certification on its purchase orders to the steel mills in place of the certification shown in M-21-b-1?

No. All orders for general steel products placed by warehouses with steel producers for shipment to warehouse stock must be accompanied by Form CMP-11 properly signed and filled out as required by Order M-21-b-1.

• Now that concrete reinforcing steel bars have been moved from a merchant trade product to a general steel product, what is the procedure necessary for a warehouse to have its former quota for reinforcing bars added to its base tonnage of general steel products?

The Warehouse Branch, by referring to the original statements submitted by warehouses on Form PD-83-a, is re-establishing the base tonnage of concrete reinforcing bars as a general steel product under General Preference Order M-21-b-1. No application for such consideration is necessary at this time.

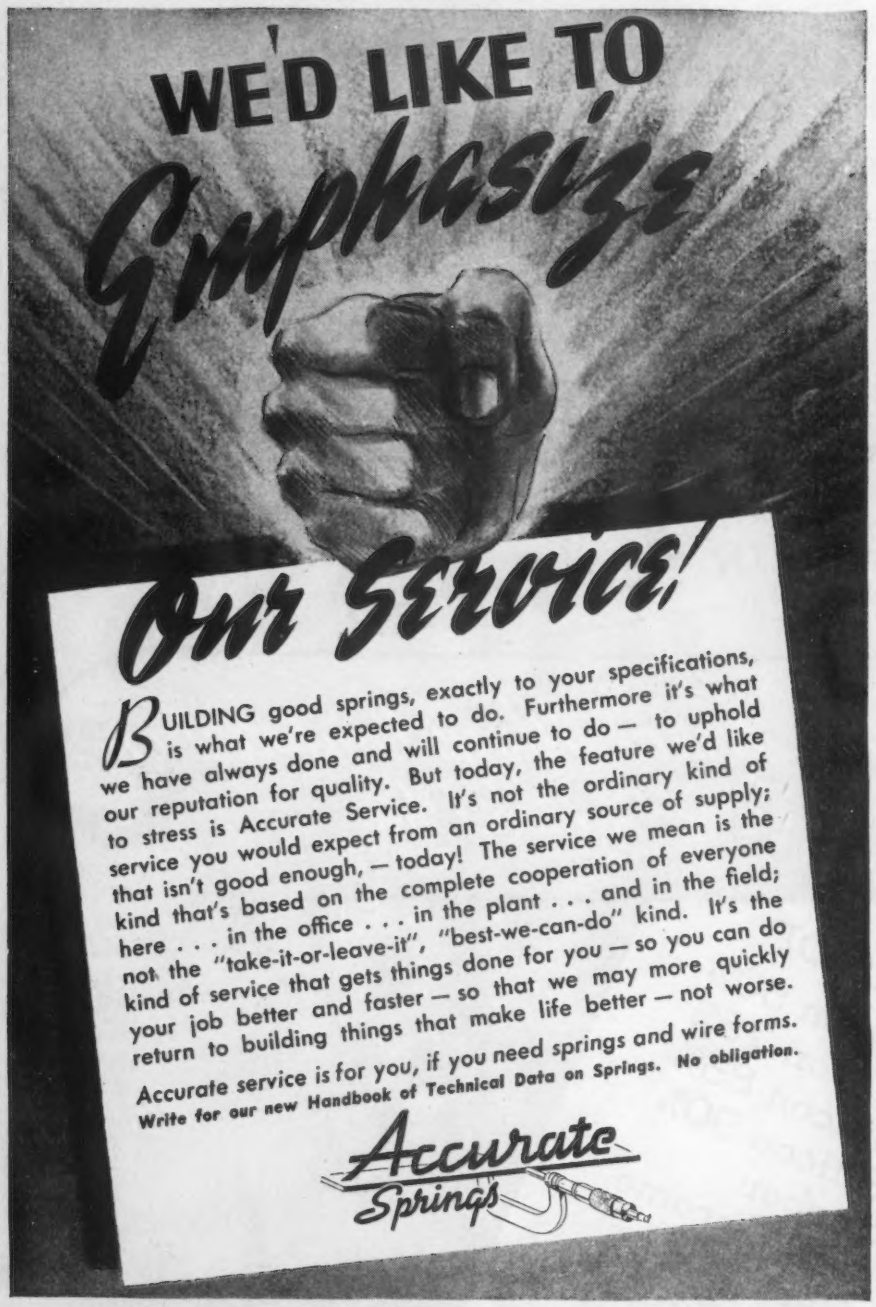
• Steel producers are directed to reject orders from distributors after they have booked orders for their maximum Warehouse Load Directives for General Steel Products. In view of this, how can warehouses extend CMP-11's up to 150 per cent or even 100 per cent of their base tonnage in various group classifications?

The minimum warehouse load established with all producers for any product group equals or exceeds average current monthly warehouse shipments of such product group. Because it is not expected that all warehouses will specify up to 150 per cent of a particular product group, the needs of a particular warehouse in this respect should present little difficulty from the standpoint of mill scheduling.

• Under Order M-21-b-1 will a warehouse be allowed to purchase rejected material from a producer without filing CMP-11 with his order, and must this same tonnage be included as a part of the jobber's permissible purchases?

All steel purchased from producers must be supported by Form CMP-11, whether of prime or secondary quality. Moreover, all purchases from producers represent a part of the tonnage a warehouse is eligible to order under the terms of Paragraph (c) (3) of General Preference Order M-21-b-1.

• We stock carbon steels only. It is our understanding that we can use tonnage of structurals, bars, cold finished, plates and sheets, all carbon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Emphasize
Our Service!
BUILDING good springs, exactly to your specifications, is what we're expected to do. Furthermore it's what we have always done and will continue to do — to uphold our reputation for quality. But today, the feature we'd like to stress is Accurate Service. It's not the ordinary kind of service you would expect from an ordinary source of supply; that isn't good enough, — today! The service we mean is the kind that's based on the complete cooperation of everyone here . . . in the office . . . in the plant . . . and in the field; not the "take-it-or-leave-it", "best-we-can-do" kind. It's the kind of service that gets things done for you — so you can do your job better and faster — so that we may more quickly return to building things that make life better — not worse.
Accurate service is for you, if you need springs and wire forms.
Write for our new Handbook of Technical Data on Springs. No obligation.
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Speeds Production on the Industrial Front–

Elevating Platform Trucks

Mercury Elevating Platform Trucks are available in the following models:

"Junior" Models: Low and high lift types. 4000 lbs. capacity. Compactly designed for work in confined areas.

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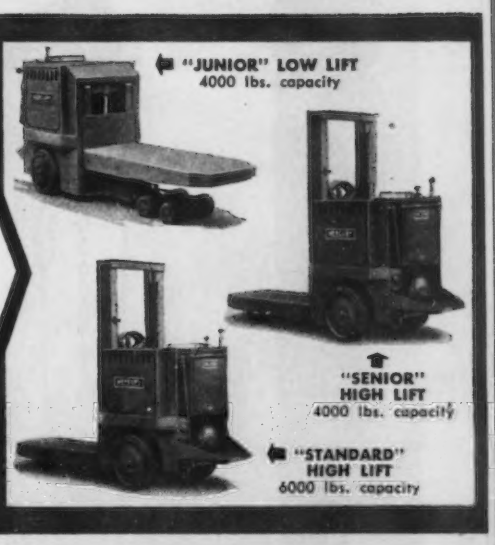
"Standard" Models: Low and high lift types. 6000 lbs. capacity. Sturdy, rugged design.



Fork Trucks

"Jeep" Sit Down, Center Control Fork Truck. 2000 lbs. capacity. Compact design affords easy manipulation in confined areas.

"Yak" Center Control Fork Truck. 4000 lbs. capacity. Rugged design.

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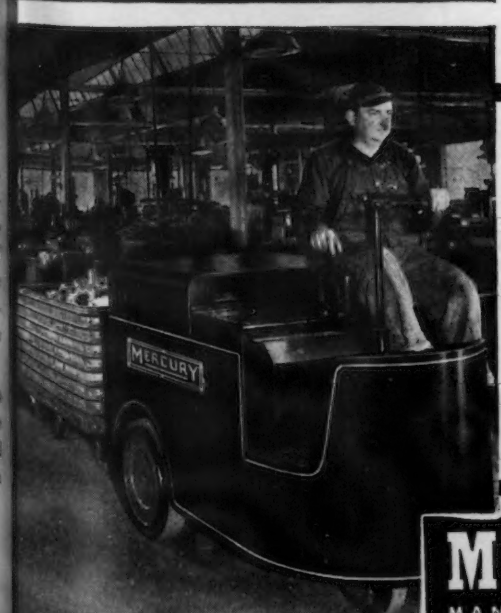


Tractors—Trailers

"Tug" Electric Tractor: A powerful compact tractor available in "twin-wheel", and "4-wheel" models, medium or heavy duty

"Banty" Gas Tractor: The most compact tractor made, yet develops a draw bar pull in excess of 2000 lbs. Thousands now in use.

Trailers: Available in castor or 5th wheel steer, platform or side dump types.

For detailed information on Mercury tractors, trailers, and lift trucks, request Bulletin-230.

MERCURY TRACTORS TRAILERS LIFT TRUCKS

MANUFACTURING CO. 4144 S. Halsted St., Chicago

THEY'RE Rugged!

but make 'em last!

FORD CHAIN BLOCKS, whether **TRIBLOCS, SCREW HOISTS** or **DIFFERENTIAL HOISTS,** are rapidly, efficiently, and economically keeping their war loads moving. **FORD CHAIN BLOCKS** are sturdy mechanical soldiers in this war for freedom against tyranny—and as such deserve the consideration given all soldiers. They should not be overtaxed; they should not be weakened by overload; they should have a regular "ration" of lubricant. Here are five ways to make your **FORD CHAIN BLOCKS** last longer and do better work.

- **The gear cover should be removed occasionally and a small quantity of heavy graphite grease applied to gear train.**
- **The load chain should be cleaned and lubricated frequently with a heavy oil, particularly at engaging points of links.**
- **Load sheaves should also be greased.**
- **Oil the bearings frequently so that no bearing will run dry and cause excessive wear.**
- **Oil holes are provided in the TRIBLOC at vital points. These should be used frequently.**

When given intelligent care, thoroughly cleaned and lubricated at intervals, **FORD TRIBLOCS** will remain efficient under the hardest usage for a long time. Your **FORD HOIST** can be one of your best friends during this production emergency. Take care of it.

Order from Your Distributor

FORD CHAIN BLOCK DIVISION

Philadelphia, Chicago, Denver, Los Angeles, San Francisco, Portland

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

steel, sold in one month and order a equivalent amount of tonnage fo shipment in 90 days, but it is no necessary to order the same amoun of each commodity sold. Moreover we can use all of the tonnage fo any one of the products, providing we do not order more than 150 pe cent of our base tonnage, of tha product, for the quarter. Are w correct?

Yes. Order M-21-b-1 requires warehouse to segregate its previou deliveries only by type of steel. Thus it is possible for a warehouse to orde hot rolled carbon steel sheets against previous deliveries of structura shapes, providing it has a base ton nage for both.

• If I purchase idle and excess ma terial from persons other than pro ducers and sell same, may I exten the allotments received from such sales on Form CMP-11 to purchas material from a producer?

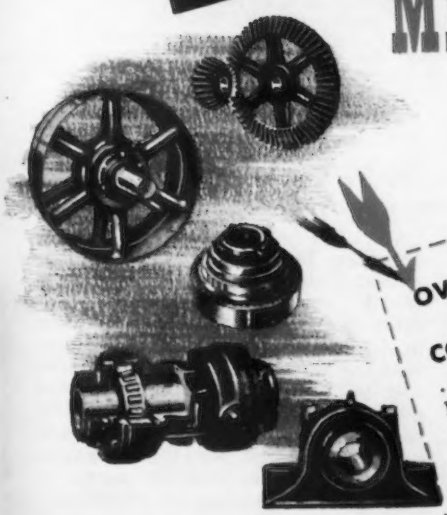
Yes, but your purchases of any product group from a producer dur ing any calendar quarter must be lim ited to not more than 150 per cent of your base tonnage for such product group.

PROPELLER CONTROL: George W. Brady, chief engineer, Propeller Division, Curtiss-Wright Corp. demonstrates how a small alternator on a warplane engine controls the new Curtiss automatic engine speed synchronizer. The device enables the pilot of a four-engined plane to automatically synchronize his engines by simply adjusting a small knob instead of manipulating four separate levers one by one.

A "K. P.'s" Dream Come True!

WHEN THE PROBLEM CALLS FOR SPECIAL EQUIPMENT

MEDART has made it...or Medart can make it!



OVER 1,000,000 PATTERN COMBINATIONS

...in our files. Very likely there is on hand the solution to your own specialized problem! Call Medart for special equipment.

Much as the fanciful machine pictured above might make the K. P.'s lot a happier one, Medart's job today is more purposeful . . . supplying special machinery for today's specialized jobs. Some of the special machinery created by Medart during the past year includes:

- ★ *An automatic machine for straightening rifle barrels.*
- ★ *A mechanism for driving a portable 1000 H. P. generator with ten 100 H. P. diesel engine.*
- ★ *A machine for de-rodding metal tubing.*
- ★ *A billet cold centering machine for tube mills.*
- ★ *A 400 H. P. gear reduction unit for a stern wheel towboat.*
- ★ *Mechanical driving units for agitator tanks.*
- ★ *Automatic bar feeding table.*
- ★ *Automatic bar delivery and storage tables.*
- ★ *Bar cradles.*
- ★ *Chain wheels.*
- ★ *Furnace car bearings.*
- ★ *Furnace door frames, etc.*

Manufacturing Engineers of Complete Transmission Equipment and Specialized Machinery

MEDART

THE MEDART COMPANY
3500 DE KALB ST., ST. LOUIS, MO.

New WPB Salvage Manual Prepared

• • • **"Salvage Manual for Industry,"** an extensive volume containing a wealth of practical, basic information as well as highly technical data on the subject, is being published by the Technical Service Section, Industrial Salvage Branch of the WPB Salvage Division. It was prepared by an editorial board of industrial executives and industrial magazine writers, assisted by many experts. John O. Emerson is managing editor.

The first comprehensive book of its kind, this volume is expected to assist the war effort materially, and also to have considerable value in the post-war era.

How to make chemical spot tests to determine specific alloys in metals scrap of all kinds; how to store and process chips; how to process foundry scrap; how to reclaim spoiled parts—these are a few of the subjects in the book.

Examination of the manuscript copy shows that many salvage methods or practices are described. It is recommended that before starting a salvage program each plant study the types, amounts and grades of its scrap; examine government orders and prices; then consider the necessity and profitable extent of segregation; then the collection and record system.

The cost of operating a salvage department is estimated at 25 to 35c. of every dollar of material reclaimed. Avoidance of waste is an important part of a salvage program, it is pointed out, and methods of lessening scrap are discussed at length.

Case histories include the setup and experiences of a large electrical company; a locomotive plant; an aircraft plant, and a stamping plant. Tool salvage by a tractor company is explained in detail.

In addition to charts, photos and tables, the volume contains an exhaustive list of waste material hints. Contents of the book include:

"Organizing and Planning;" "The Salvage Department;" "Starting the Program;" "Administrative Factors;" "Getting the Most From Supervisors and Workers;" "Scrap Records and Account-

JOHNSON BRONZE

SLEEVE TYPE BEARINGS

How to make Good Motors BETTER

It makes little difference whether you are buying, building or repairing motors, JOHNSON BRONZE can help you. In new equipment we can help you design the *type* of bearing that will guarantee the most efficient operation. For replacements, we offer you the largest range of sizes and types in bearings available. In order to get the most from your motors—consult with JOHNSON BRONZE. Let us help you make good motors *BETTER*.

NEW *Catalogue*

Lists and describes the most complete stock bearing service available. Write for your free copy.

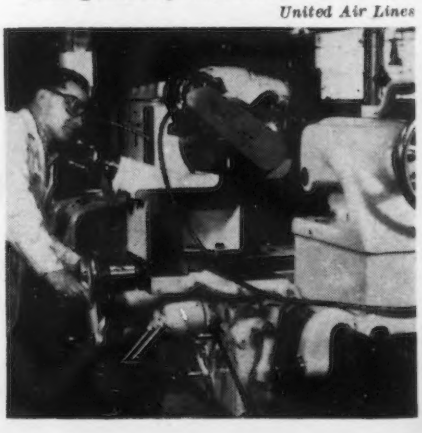
JOHNSON BRONZE

SLEEVE BEARING HEADQUARTERS

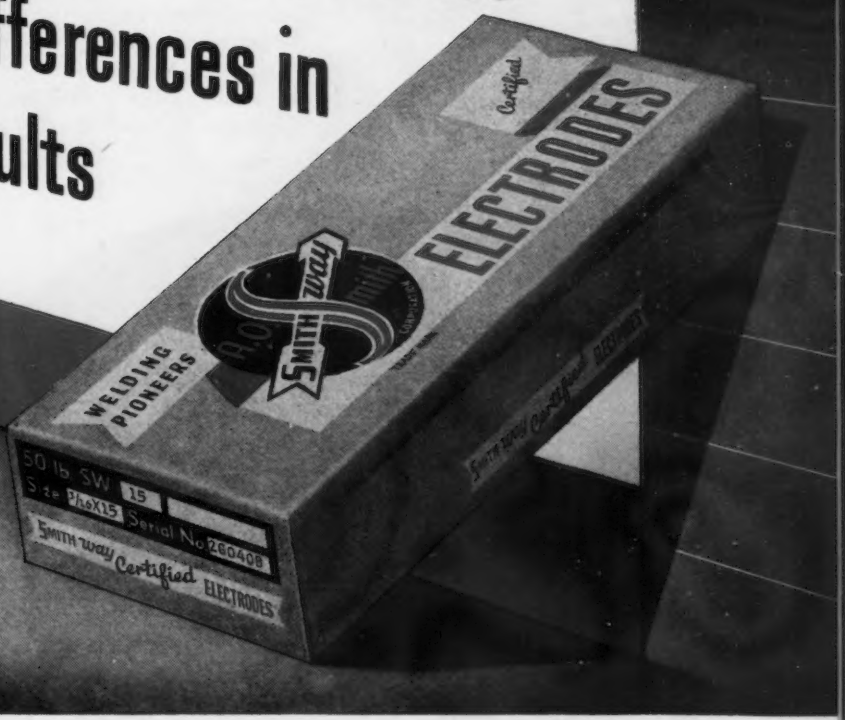
505 S. MILL STREET NEW CASTLE, PA.

"THREE-DIMENSIONAL" PAINTING: The effect of careful paint selection for various parts of machines under the new "three-dimensional" system developed by DuPont is shown in this picture taken at United Air Lines' central maintenance base. Parts of the lathe are painted buff; safeguards are done in orange, and the balance of the machine is gray. Results are less eye fatigue for the operator, fewer accidents, greater accuracy and generally increased efficiency.

United Air Lines



Slight Variations in Electrodes Make Big Differences in Welding Results



☆ Lack of uniformity in welding electrodes has always been the bane of the welding business. A *slight* variation in concentricity, for example, can make as much as 15 or 20 per cent difference in the cost of deposited metal. And it can make *just as much difference* in the *quality* of completed welds.

That is why we go to unprecedented lengths to assure *uniformity* in SMITHway Certified Welding Electrodes — not only as to concentricity, but also as to metallurgical characteristics of the wire and chemical analysis of its coating.

We know from our own shop experience that it pays us to put this extra effort into producing *better electrodes*.

We think we can *prove* that SMITHway Certified Welding Electrodes mean *more good welds* per man-hour at considerably *lower cost* in your plant, too.

Mild Steel . . . High Tensile . . . and Stainless Steel

WELDING ELECTRODES

made by welders . . . for welders

SMITHway Welding Monitor: *cuts time cost of training welders as much as 33⅓% by automatically signaling operator when correct feeding speed is or is not being maintained.*

SMITHway AC Welding Machine: *no arc blow; reduces spatter losses; effects worthwhile overall power saving; gives more good welds per man-hour.*

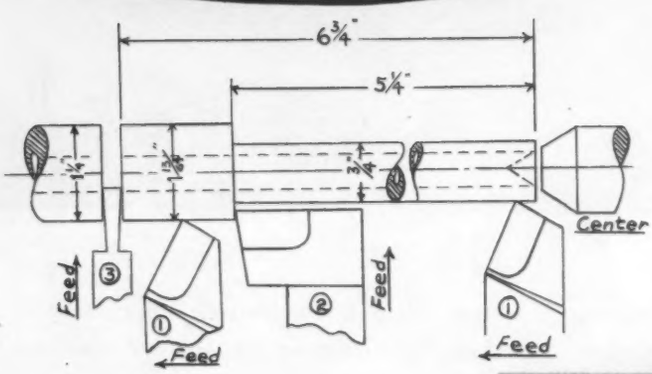
A.O. SMITH *Corporation*

MILWAUKEE • WISCONSIN • HOUSTON • TEXAS

ing;" "Government Regulations and Orders;" "Salvage Practice: Metal Scrap;" "Avoiding Waste;" "Dormant Scrap and Obsolete Equipment;" "Reclaiming Spoiled Parts;" "Reclaiming Cutting Tools;" "Scrap Classifications and Segregation;" "Collection of Production Scrap;" "Identification of Materials;" "Storing and Processing of Chips;" "Processing Foundry Scrap for Re-Use;" "Miscellaneous Metal Scrap Processing;" "Handling and Disposing of Reusable Containers;" "Disposal by Sale Outside;" "Non-Metallic Waste;" "Oils and Greases;" "Organic Materials —Paints, Solvents, Plastics, etc.;" "Miscellaneous Non-Metallic Waste;" "Case Histories;" "A Large Company with Diversified Scrap Types;" "Salvage at a Large Machine Shop;" "A Typical Aircraft Plant;" "A Dormant Scrap Program;" "A Tool Salvage System;" "Some Special Problems and Techniques;" "Plant Promotion and Publicity;" "A Chip-Handling System;" "An Oil-Reclaiming Setup;" "Waste Materials Hints —A Classified List of Scrap Items."

While distribution of the book will be made by the WPB Industrial Salvage Branch to a list of interested executives, it is likely several thousand additional copies will be for sale at a moderate cost through the Superintendent of Documents.

KENNAMETAL*
Outproduces Other Carbides in Cutting Stainless Steel



• KENNAMETAL again gives the top steel-cutting performance on a tough job!

In an actual shop run KENNAMETAL turned 12 pieces of stainless steel tubing at 920 rpm and 2 more pieces at 1480 rpm in comparison with 8 to 10 pieces per grind by competing carbides. Only with KENNAMETAL was this job machined without appreciable loss of size.

The material was 18-8 stainless steel tubing (2.5 manganese). The operation employed feeds of—tool #(1) .010"/Rev., tool #(2) hand feed, tool #(3) .004"/Rev. The tools that were used in this operation are illustrated.

For boring, turning, and facing to close tolerances use KENNAMETAL steel-cutting carbide tools.

Write for your copy of the KENNAMETAL Tool Manual. It contains information on the handling and proper use of steel-cutting carbide tools.

KENNAMETAL Inc.
144 Lloyd Avenue Latrobe, Pa.
Trade Mark Reg. U. S. Pat. Off.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York (Exclusive of Canada and Great Britain)

KENNAMETAL THE All American CARBIDE

OPA Organizes New Malleable Iron Industry Group

Washington

• • • **Organization of a Malleable Iron Castings Industry Advisory Committee which is consulting with OPA officials on malleable iron castings pricing matters has been announced by OPA.**

The committee began discussion of proposed revision of certain sections of MPR No. 241 to more closely fit industry needs. The committee follows:

R. R. Fauntleroy, chairman, Moline Malleable Iron Co., St. Charles, Ill.; Anthony Haswell, vice-chairman, Dayton Malleable Iron Co., Dayton, Ohio; J. H. Redhead, Columbus Malleable Iron Co., Columbus, Ohio; Ralph N. Cole, Canton Malleable Iron Co., Canton, Ohio; Charles A. Gutenkunst, Jr., Milwaukee Malleable and Grey Iron Works, Milwaukee, Wis.; W. H. Moriarty, National Malleable and Steel Castings Co., Cleveland; John Wagner, Wagner Malleable Iron Co., Decatur, Ill.; F. L. Engels, Oriskany Malleable Iron Co., Oriskany, N. Y.

Engine Group Formed by WPB

Washington

• • • **The War Production Board announced the formation of an additional industry advisory committee during the past week.**

Industrial Liquid Cooled Gasoline Engines Industry Advisory Committee

Government presiding officer: R. L. Vaniman; committee members are:

Charles Ballough, Hercules Motors Corp., Canton, Ohio; L. H. Crafts, Sterling Engine Co., Buffalo; A. W. Lavers, Minneapolis-Moline Power Implement Co., Minneapolis, Minn.; Ralph K. Mangan, The Buda Co., Harvey, Ill.; J. E. De Long, Waukesha Motor Co., Waukesha, Wis.; Earl Ginn, Continental Motors Corp., Muskegon, Mich.; J. A. O'Malley, Chrysler Corp., Detroit; C. W. Pendock, Le Roi Co., Milwaukee, Wis.; R. B. Harvey, Novo Engine Co., Lansing, Mich.

• Fire July 13 in the new $20,000,000 Dow Magnesium Corp. plant at Marysville, Mich., caused $500,000 damages and curtailed production for about two days. The fire broke out when a magnesium pot boiled over, causing collapse of the roof in one unit soon afterward. The plant went into production April 8.

Ruttenberg Appointed To New Post on WPB

Washington

• • • **Harold J. Ruttenberg** of Pittsburgh has been made assistant director for manpower in the WPB Steel Division. Mr. Ruttenberg, who is research director of United Steelworkers of America, and formerly of SWOC, will handle all functions involving labor production and manpower requirements for the Steel Division.

AMES AMPLIFYING COMPARATOR No. 26

shaped indi-
s a total spin-
el of 2/1000",
a measuring
y of 1/1000"
nd 1/1000"
om zero. With-
imited range
uracy is held
01".

nd Point re-
ear to a min-
giving thou-
of successive
readings.

This precision built Comparator stands solidly on a large diameter base and is heavily constructed to eliminate all spring. It is intended for use in making comparisons of duplicate parts for size and will indicate the most minute variations on the dial, with ability to give repeat readings. The cast iron base supports the steel upright column, which has a rack for up and down adjustment of the indicator. The adjustable stop assembly helps to locate work on the hardened and ground anvil.

SPECIFICATIONS

Total height 15". Base diameter 11". Total measuring capacity 6". Indicator total range .002". Distance from contact to front of Post 3½". Anvils 2⅛" x 3¼". Special anvils to order. Diamond contact point. Light pressure. Approximate weight 40 pounds.

Send for bulletin COMP. 102

(Above) Checking Size to .0001" or Le

PROMPT DELIVERY

Manufactured By **B. C. AMES CO. • WALTHAM, MASS., U. S. A.**

Branch Offices: 423 New Center Bldg., Detroit, Mich. • 420 Lexington Ave., New York, N. Y.

Briefly Told—

Foundries Reported Facing Most Severe Shortage of Labor

• Milwaukee foundries are reported to be up against the "worst" labor shortages they have faced and some are operating at as little as 50 per cent of capacity as the result. One foundry employment manager attributes the reason to the fact many new employees are from white collar environment and don't care to tackle heavy foundry work.

•

• The Tennessee Coal, Iron & Railroad Co., Birmingham, blew out its blast furnace at Holt, Ala., July 22 for repairs. With one of the company's Ensley stacks being relined, eight of the company's 10 blast furnaces remain in production.

•

• Production for the first half of the 1943 fiscal year by the two Detroit plants of Republic Aircraft Products Division of the Aviation Corp. showed an increase of more than 25 per cent over the production for the last half of 1942. It was almost double the output in the first half of last year.

•

• New orders for fabricated structural steel (buildings, bridges, and sundry war products items) booked during June, 1943, according to reports received by the American Institute of Steel Construction, Inc., amounted to 99,418 tons, as compared with 184,516 tons for the corresponding month last year.

•

• Advanced practices in the application of metallurgy in the United States will be communicated to Brazilian scientists and industrialists during the coming year through a technical educational project established at the Escola Politecnica of the University of Sao Paulo, a leading engineering school of Brazil. Four outstanding United States scientist-educators will give lectures on fundamental metallurgy over a period of a year. The lecturers are: Dr. A. Allan Bates, Dr. Robert F. Mehl, Arthur Phillips and Gregory J. Comstock.

•

• The Philadelphia Ordnance District on July 24 opened its "Ordnance for Victory" display of American and captured enemy materiel. The entire eighth floor of the John Wanamaker store is devoted to this showing of guns, tanks and bombs as well as to the exhibits of 83 Philadelphia war plants.

•

• Rest in Peace! The controversy over grade labeling and standardization finally has been laid to rest. Senator Taft of Ohio told THE IRON AGE that grade labeling and the elimination of brand names are now not permissible under the law and that standardization is permitted under the conditions outlined in his amendment to the CCC bill.

•

• *The Seaman Body plant in Milwaukee has started development work on the manufacture of helicopter parts.*

•

• More ships! Contracts for the construction of 223 Liberty ships were announced July 26 by the Maritime Commission. The New England Shipbuilding Corp., South Portland, Me., was awarded a contract for 115 of the ships, while the Houston Shipbuilding Corp., Houston, Tex., was awarded a contract for the remaining 108 vessels.

•

• About 80 to 90 per cent of the steel plant workers in the Buffalo area are now working 48 hr. a week, receiving time and a half for all over 40 hr. Part of the remaining 10 per cent are being offered extra time, some of it in departments other than their own, a survey shows.

•

• *Buffalo Forge Co. and subsidiaries reported net profit for the quarter ending May 31 of $320,303, equal to 98 cents a common share, against $401,530 or $1.23 a share in the same quarter last year.*

•

• War production in the automotive industry in June increased to $725,000,000 from $705,600,000 in the preceding month, according to the Automotive Council for War Production. Deliveries in June, a year ago, were $383,800,000.

•

• Retroactive pay amounting to about $3,500,000 was scheduled to be received by Curtiss-Wright workers in the Buffalo plants Aug. 2 under the terms of a WLB decision. The back pay will go to em-

SAFE LANDINGS

Photo Republic Aviation

now it can be told— the story of VIM-packed Shock Struts

When a severe winter found our planes in Arctic sub-zero locations in this global war, the packings formerly used on shock struts began to fail. Lives were endangered, vitally needed planes damaged.

We recommended a combination set, with specially impregnated VIM Leather Packings for high pressures and low temperatures, synthetic rubber for high temperatures and low pressures. These sets were rushed to the Arctic, checked by our own engineers on the job.

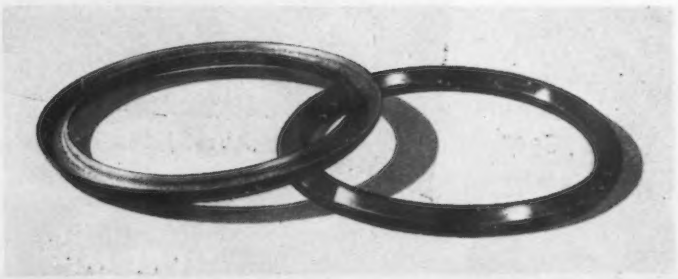
Since then, aircraft builders and shock strut makers have turned to VIM Leather Packings, in ever increasing volume.

Remember, when you need help on a packing design, Houghton provides a dual service: engineering design and field assistance—the "plus" values of VIM Leather Packings. Write for 4-page abbreviated catalogue folder.

E. F. HOUGHTON & CO.

PHILADELPHIA

Chicago • San Franciso • Detroit



HOUGHTON'S *Engineered* **VIM** *Leather Packings*

MOORE RAPID *Lectromelt* FURNACES

Lectromelt top charge furnaces are rapidly charged by means of a crane handled drop bottom charging buckey, thus increasing America's tonnages of carbon and alloy steels.

Lectromelt top charge furnaces, simply yet ruggedly constructed, are available in sizes from 100 tons to 250 pounds capacity. They are designed to meet today's demands for quality steel, faster.

Write for complete information

PITTSBURGH LECTROMELT FURNACE CORP.

PITTSBURGH, PENNSYLVANIA

ployees affected by elimination of a bonus system by the decision.

•

• Bell Aircraft Corp., Buffalo, will soon begin operating a plant in Burlington, Vt., making machine gun mounts. The DPC has announced the execution of a contract with Bell for plant facilities in Vermont costing about $2,000,000.

•

• Substantial price reductions have been made on all models of the portable welding refrigerator units produced by Frostrode Products, Detroit, the company has announced. The reductions range from 10 to 23 per cent.

• The War Plant Protective Association of Western Massachusetts which has won national recognition as being the first organization of its kind in the nation to develop and operate a unified program for insurance of plant, facilities and personnel safety, placed its program before the war plant protection conference in New York, July 22. The association serves as a clearing house for ideas and problems of individual plants, maintaining a policy of no secrets, no politics, no preference and no prejudices.

•

• Employees of the Curt G. Joa, Inc., plant at Sheboygan Falls, Wis., took their first vacation in two years when the plant shut down for repairs recently. It was a patriotic vacation; they all went to work on farms in the town's vicinity.

•

• **Attorneys for the Century Division of the Reliance Steel Corp., Cleveland, state that the New York Supreme Court has granted their client an injunction restraining the Century Steel Sales, Inc., an Illinois corporation, from use of the name "Century."**

•

• *Inland Mfg. Corp. Division, General Motors Corp., Dayton, Ohio, was congratulated last week by Col. F. A. McMahon, district chief of the Cincinnati ordnance district for completion of the half-millionth carbine since Pearl Harbor. The souvenir carbine was dedicated to Ohio's heroic Pfc. Sidney Rapeport, who cleaned out five machine gun nests single-handed in Tunisia with a carbine.*

a Craftsman's care...

Closeup of three inch Gleason straight bevel generator, one of a complete range at Fairfield.

...in every Fairfield Gear

GEARS MADE TO ORDER

Straight Bevel
Spiral Bevel
Hypoid
Spur
Herringbone
Helical
Worm Gears
Worms
Differentials

ALTHOUGH the modern equipment on which Fairfield gears are produced is capable of uncanny accuracy on large scale production, every operation is nevertheless under surveillance of skilled craftsmen to insure the finest possible workmanship. Fairfield cuts no corners, but puts painstaking effort into the production and inspection of every vital gear and part going into equipment upon which the lives of civilians and soldiers and the safety of our nation rest.

Consult Fairfield on your requirements—if they can be handled, you'll be sure of a craftsman's care in every piece.

ARMY E NAVY

FAIRFIELD MANUFACTURING COMPANY
305 S. Earl Avenue • Lafayette, Indiana

FAIRFIELD For FINE GEARS

Plastics and Plasticity

(CONCLUDED FROM PAGE 69)

subject to dissipation or disintegration due to acids, alkalies or other materials with which it may come in contact. The chemical reactions of the constituents of any composite material with its surroundings promises to continue to be a major problem for the chemists. Referring to the use of molded plastics in contact with various liquids or pastes, a leading molder warns: "Although the general effects of the better known reagents on the molded materials are given, it is surprising and at times embarrassing to see the havoc that can be created when a seemingly innocent little stranger slips into the contacting material."

Pressure Forming, which is the economical mass production method, now appears applicable to a tremendous variety of elements and combinations of elements in the expanding picture of engineering materials. As the fundamentals of many arts become common knowledge, it develops that a comparatively few basic working principles apply whether the materials are ceramic clays, glasses, plasters; organic woods, fibers, rubbers, synthetic resins; metals, new and old in whatever form, or the various intercombinations of these several groups. The presentation of compositions, physical properties and temperature-pressure relations in the several states of plasticity and fluidity attempted in Tables III and IV shows many present gaps. As the data accumulates, however, the methods of economically moving the material into required shapes need offer no great difficulty.

(To be continued)

for the DURATION!"

Nothing against you, Litecote. You've always been a good electrode. But this is war! And your place must be taken over by other electrodes more urgently needed in war production —in arsenals, shipyards—and for maintenance of vital machinery on the home front.

You're in retirement until the war is over. Meanwhile, the production of P&H Alloy Electrodes is being increased to supply the demand for more and more uses in hard surfacing, in resistance to wear, impact and abrasion, for welding stainless steels, 4-6% chrome steels, armor plate, etc.

Procedures for P&H Alloy Electrodes are available on request.

P&H *Alloy* ELECTRODES

P&H builds a complete line of A.C. and D.C. welders — all with single control. All P&H machines are rated on W.S.R. which is actual delivered output.

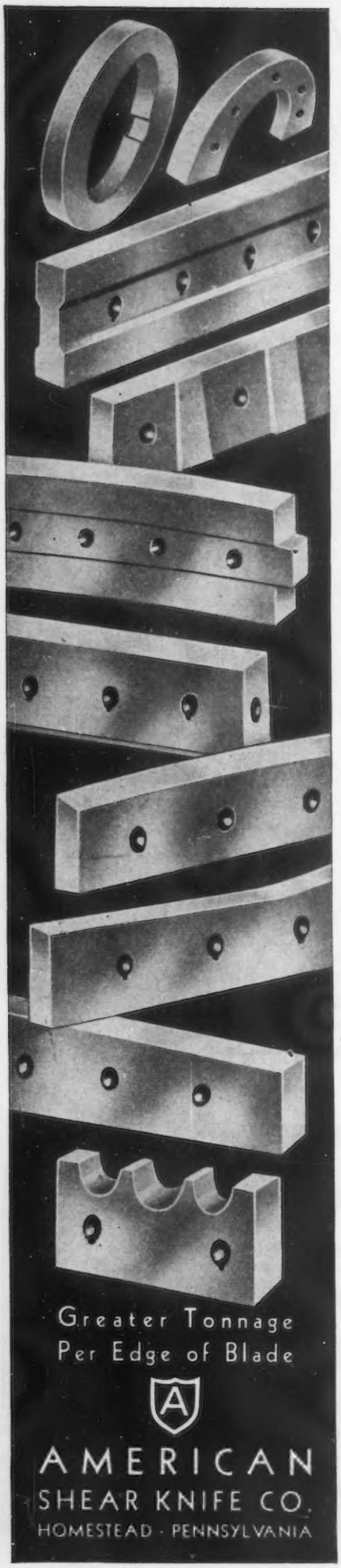
ARMY E NAVY

A new star has been added to P&H's award for excellence in war production.

General Offices: 4401 W. National Avenue, Milwaukee, Wis.

HARNISCHFEGER
CORPORATION
WELDING ELECTRODES · MOTORS · HOISTS P&H ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.



Wire and Cable Prices Adjustment Policy Set

Washington

• • • **Provisions for the** individual adjustment of ceiling prices for producers and sellers of wire, cable and cable accessories similar to adjustment provisions recently made available to manufacturers of essential machinery were announced last Friday by OPA.

The action, contained in Amendment No. 4 to Revise Price Schedule 82, which becomes effective Aug. 4, 1943, is confined to cases qualifying under rigid tests of essentiality of the seller and the product.

Generally, the new provisions will permit OPA to adjust prices after it has ascertained that ceiling prices are at such a level that supply of vital wire or cable is impeded or threatened, provided that the adjusted price will not cause an increase in the cost of living.

Price Briefs

• Amendment 11 to Revised Sup. Reg. 14 advances the effective date upon which manufacturers of semi-fabricated silver products may charge the same prices for products made of Treasury silver sold under the Green Act as they are permitted to charge for items made of newly-mined silver from Aug. 2 to July 29. (Release No. TCS-701)

•

• Amendment 1 to Max. Price Reg. 405 makes minor adjustments in the ceiling prices of 15 per cent electric furnace ferrosilicon. (Release No. TCS-709)

•

• Order 19 under Revised Price Sched. 41 allows producers of locomotive and tender steel castings to agree to deliver and deliver at adjustable prices on and after June 10.

•

• Amendment 5 to Max. Price Reg. 133 allows farm equipment retailers to pass on to consumers the actual transportation charges incurred by them instead of "average combined freight charges." (Release No. TCS-606)

•

• Amendment 4 to Max. Price Reg. 351 makes provisions for the adjustment of maximum prices charged by manufacturers of ferrous forgings, similar to those recently provided for manufacturers of machinery and for rebuilders and repairers of construction equipment. (Release No. TCS-663)

•

• Amendment 96 to Max. Price Reg. 136 revises the price ruling on second-hand machinery. All new trucks, buses and commercial trailers which are produced as a result of recent WPB authorization are to resume limited production under price control. (Release No. TCS-676)

•

• Amendment 4 to Price Schedule 82 gives provisions for the individual adjustment of ceiling prices for producers and sellers of wire, cable and cable accessories. (Release No. TCS-669)

•

• Amendment 31 to Revised Sup. Reg. 11 clarifies exemptions from price control of charges for specified services on airplanes, tanks and military vehicles for any war procurement agency. (Release No. TCS-648)

•

• Amendment 3 to Max. Price Reg. 314 authorizes sellers of magnesium or magnesium alloy ingot in special non-standard shapes which cannot be produced at the premium of one cent a lb. permitted for non-standard shapes, to submit proposed prices for such shapes to the OPA for approval. (Release No. TCS-670)

WPB Clarifies Authorization For Construction Procedure

Washington

• • • **In cases where** specific WPB authorization is not required under Order L-41 to begin construction, CMP Regulation No. 5 procedures may be used to obtain required materials and products up to $500 in cost, WPB pointed out last July 31.

However, CMP Regulation No. 5 procedures may not be used to get materials or products for any construction work of the type which requires authorization under Order L-41 unless the authorization specifically states that CMP Regulation No. 5 may be used.

Minor Adjustments Made in Ceiling Price of Silvery Iron

Washington

• • • **Minor adjustments** in the ceiling prices of 15 per cent electric furnace ferrosilicon (silvery pig iron) were announced July 31 by OPA. These changes, it was said, result in making the ceiling prices conform exactly to industry pricing practice, and are as follows:

1—Price differentials for silicon content are set up on a range of one-half of one per cent, instead of for each one-fourth of one per cent as was provided previously.

2—The premium for each additional one-half of one per cent of silicon content is now permitted for any part of the increment in the premium bracket. Previously, premiums were allowed for additional quarterly amounts, but not for a fraction of a quarter.

3—The penalty for a phosphorous content of 0.70 per cent or more is abolished.

4—A premium of 50¢ for each one-half of one per cent or fractional part of manganese in excess of one per cent is established.

New Forms Issued by WPB

WPB-180—Steel: Statement of monthly capacities, actual production and scheduled production from producers of steel ingots and castings covered by Order M-21.

WPB-2948—High pressure blowers, exhausters, compressors and vacuum pumps: Application for authorization to purchase.

WPB-317—Aluminum scrap: Monthly report of production, stocks and disposition.

WPB-2499—Aluminum scrap: Quarterly report of production, stocks, and disposition.

WPB-2752—Resistance welding machines and controls: Application for authorization to purchase.

WPB-2593—Aluminum ingot: Monthly report of shipments and unfilled orders.

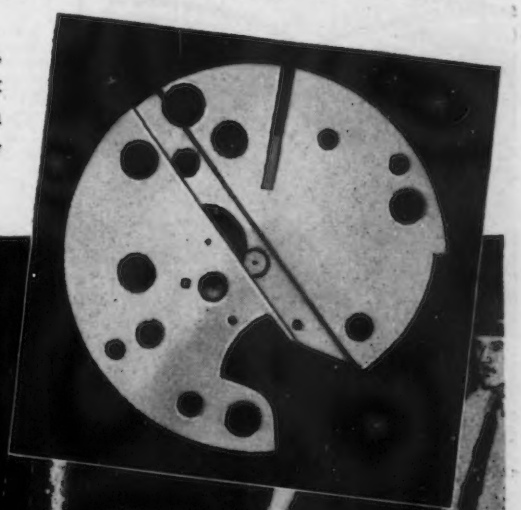
WPB-3002—Manufacturers' monthly report of unfilled orders and schedule of shipments.

WPB-732—Report of operations due July 25, 1943.

LINES BEHIND THE LINES

FROM RANGES, REFRIGERATORS AND RADIOS . . . TO BOMBS, SHELLS AND TORPEDOS . . . THE APPLIANCE INDUSTRY CONVERTS TO WAR!

Skilled as it is in the manufacture of complex small parts assemblies, the appliance industry utilizes, in war as in peace, the most efficient production methods available. Broaching is high on its list as a better way to do many metal-working jobs—the only *right* way to do some!



UPPER RIGHT. Broaching the diagonal slot in this brass fuse part is typical of the production-with-precision work required. Using an American 16" Rotary Machine, with 8-station fixture designed for manual loading, automatic clamping and automatic discharge, extremely high output is obtained.

LOWER LEFT. American broaching engineers designed this fixture to locate and index the part from three holes, with further support by recessing part in toughened steel block to minimize burr. American's *complete* broaching service —machines, tools, and engineering—contributes mightily to winning war production, profitable post-war production.

BROACHING IS BETTER

THE *American* WAY

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES

PRESSES

BROACHING TOOLS

SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILL.

Check—Mr. Webster

"SUPERIOR—

EXTREMELY EXCELLENT OF ITS KIND; SURPASSINGLY GOOD . . ."

CHECK HOT AND COLD ROLLED STRIP STEEL

CHECK CARBON AND ALLOY . . .

CHECK STAINLESS and SUVENEER CLAD METAL

YOUR INQUIRIES ARE INVITED

SUPERIOR STEEL CORPORATION
CARNEGIE, PENNA.

Priority Changes

E-5-a—Amended order eliminates the special endorsement formerly needed for obtaining hand tools. (7-27-43)

•

L-22, L-23c, L-185—Amended orders allow a small amount of production to meet essential civilian requirements for domestic heating furnaces, stoves, ranges and water heaters. (7-29-43)

•

L-41—Amended order makes minor changes in order to reflect changes made in other orders. (7-28-43)

•

L-64—Amendment 1 permits continued production of concrete burial vaults and also to sell certain types of oversize caskets without certification of need. (7-26-43)

•

L-76—Amended order allows unrestricted manufacture of Type 5Y3G radio tubes. (7-27-43)

•

L-89—Int. 1 clarifies certain points about which questions have arisen regarding replacement of elevator parts. (7-29-43)

•

L-107—Amended order restricts distribution of extended surface heating equipment to "Approved Orders"—those which specify a delivery date, are rated AA-5 or better or which are for repair parts. (7-30-43)

•

L-114—Amended order eases the restrictions on the use of copper base alloys and alloy steel in the manufacture of certain items of safety equipment. (7-26-43)

•

L-154—Sched. VI contains specifications designed to conserve materials in the construction and installation of steam turbines for land use. (7-29-43)

•

L-196—Amendment 3 exempts farmers from registering their used construction equipment. (7-26-43)

•

L-298—Amendment 1 exempts purchase orders for resistance welding equipment received prior to July 27 from the restrictions on delivery imposed by the original order. (7-27-43)

•

L-302—Amendment corrects an error in proof-reading in the original order. (7-27-43)

•

M-21-g—Amended order clears up technical descriptions of the uses for which certain analysis of alloys are permissible. (7-26-43)

•

M-56—Order revoked. (7-28-43)

•

M-61-a—Order limits the manufacture of both standard size and special size graphite crucibles. (7-27-43)

•

M-65-a—Amended order prohibits the use of cadmium in pigments, except for specific purposes, most of which are military. (7-26-43)

•

M-199—Amended order makes possible the distribution of foreign, domestic and Treasury silver for essential purposes under the Green Act by setting up a new index of use. (Release No. WPB-3985) (7-29-43)

•

M-319—Amended order advances the dates on which a producer or importer who desires to use, or any person who desires to accept, delivery of manufactured crude abrasive or abrasive grain during September and October must apply for authorization. (7-29-43)

•

M-332—Amendment 1 states specifically the number of pounds of oils per gal. that must be used in different types of paints, varnishes and enamels. (7-27-43)

Elevator Repair Order Clarified

Washington

• • • **Because a number** of questions have arisen regarding replacement of elevator parts as covered in the provisions of General Conservation Order L-89 as amended June 2, Interpretation 1 to that order was issued last Thursday by WPB to clarify certain points.

The order exempts from the necessity for authorization on Form PD-411 (now WPB 1236) purchase orders for maintenance parts up to $25 per elevator and not to exceed $50 worth of such parts per elevator in any one year. The interpretation states that these dollar value limitations refer to the retail sales price of the parts exclusive of the cost of labor or other services required for installation. Moreover, the exemption covers small maintenance or replacement parts.

Repair parts, irrespective of value, are exempted from authorization requirements by L-89 only when there has been an actual breakdown or suspension of operations of the elevator.

Application Date Advanced On Abrasive Order M-319

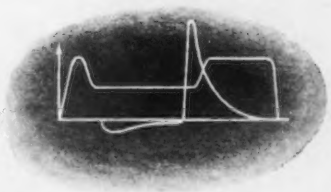
• • • **Conservation** Order M-319, dealing with abrasives, was amended July 29 so that the application limit for September-October requirements is Aug. 10 instead of Aug. 15. Future application dates are set as the 10th of the month preceding each subsequent two-month period. Form WPB-2779 (formerly PD-888) is the one used for applications for crude abrasive.

Materials Limited on Land Steam Turbines

• • • **Specifications designed** to conserve materials in the construction and installation of steam turbines for land use were issued July 28 by WPB in Schedule VI to Order L-154.

The order provides that no producer shall install on any steam turbine for land use, with certain exceptions, sheet metal lagging, asbestos or other high temperature molded insulation, ornamental trim, gage equipment larger than specified sizes or larger than the minimum practicable size, duplicate instruments, more than a single oil pump or tubing or other special materials not customarily furnished by the manufacturer for the conditions under which the turbine is to operate.

HELPING TO SOLVE TODAY'S WARTIME PRODUCTION PROBLEMS



the problem of spot-welding heavy gauges

ON ALUMINUM AND LIGHT ALLOYS

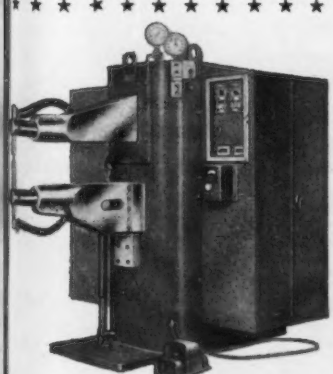
It is not generally recognized that the spotwelding of heavy gauge aluminum on a production basis is being successfully accomplished today. Many leading aircraft manufacturers are speeding up the fabrication of heavier assemblies by employing the Sciaky Process of Electric Resistance Welding.

Inasmuch as the difficulties involved in the spot-welding of aluminum increase proportionately with the increase in thicknesses used, the advantages of the Sciaky Stored Energy Principle and Variable Pressure Cycle can be readily seen. The extremely high current requirement is compensated for by the use of Stored Energy, which effects high power factor, uses less current and balances the three-phase supply.

The tremendous pressure required is obtainable by the use of a special, heavy duty head using two cylinders. These can operate either on the Variable Pressure Cycle or at constant pressure. When both cylinders are operated at constant, the maximum pressure can be made as high as 12,000 lbs.

Exhaustive tests have demonstrated the ability of the Sciaky 240 KW machine to weld satisfactorily two thicknesses of .156" aluminum in production. Under proper conditions, two thicknesses of .187" aluminum can also be fabricated by this method.

★ ★

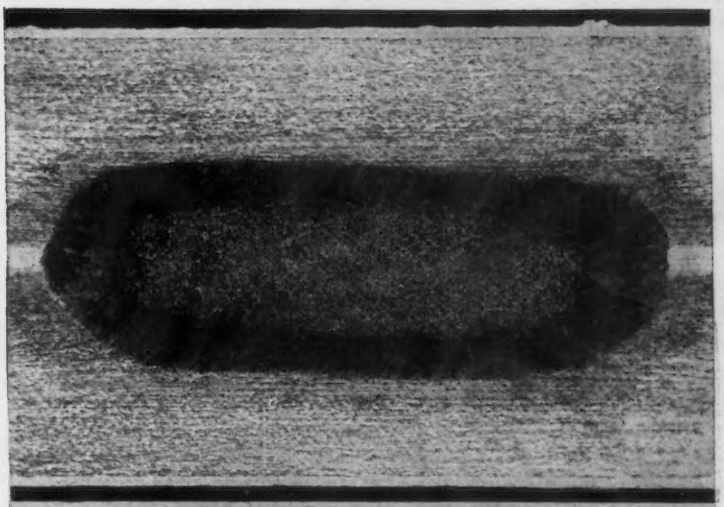


TYPE PMCR2S-5 SCIAKY ELECTRIC RESISTANCE ROCKER ARM WELDER, with built-in rectifier, welding 70 spot welds per minute on two sheets of aluminum alloy of .040" each. Welding capacity: from two thicknesses of .016" in aluminum alloys up to and including .080".

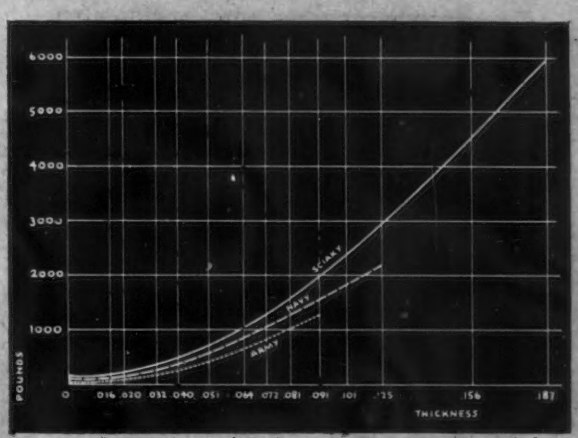
SCIAKY BROS.

Manufacturers of a Complete Line of A.C. and D.C. Electric Resistance Welding Machines.

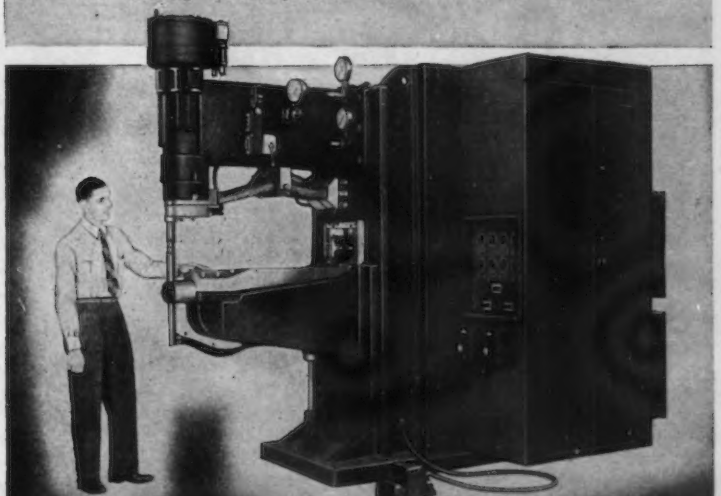
4915 W. 67TH ST. • CHICAGO, ILLINOIS



UNRETOUCHED MACROPHOTO of a typical Sciaky spot weld on .156" plus .156", 24ST Alclad at 14X Mg., indicates the weld nugget of proper penetration, and a central zone of uniform cast structure surrounded by an even columnar zone. Good grain structure with no porosity and the absence of cracks is also evident.



A comparison of Army and Navy Minimum Shear Test Values and the range of Sciaky Machines.



TYPE PMC05S-1 SCIAKY ELECTRIC RESISTANCE SPOT WELDER, 240 KW. Welding capacity: aluminum and other alloys or corrosion resisting steels in thicknesses of from .040" plus .040" minimum up to and including .187" plus .187" maximum. Speed: 40 spot welds per minute on two thicknesses of .040" of light alloys.

Finished Cargo Plane Marks Plant Dedication

Chicago

• • • **The largest** manufacturing plant in the world devoted exclusively to producing cargo planes was dedicated here July 30 when the first four-engine C-54 cargo ship produced in the mammoth new factory of the Douglas Aircraft Co. took to the air.

Simultaneous dedication of the plant and completion of the first cargo plane was made possible by the fact that Douglas engineers started production, department by department, as the building progressed. As soon as a unit was completed, machinery was installed and production work commenced. Garages were used in emergencies to keep the production of parts and assemblies moving.

The first ship left the ground only ten months after the ground was broken for the main manufacturing building.

Costing $33,000,000, the plant site comprises some 90,000,000 cu. ft. of buildings. The main assembly building, the largest wooden structure in the world, alone has more than 2,000,000 sq. ft. of floor space. Wood was used extensively in building the plant, resulting in the saving of some 30,000 tons of steel.

The C-54 cargo plane can carry 15 tons of supplies and can move 50 fully equipped and armed soldiers.

Correction: Main Trips Not Side Trips, Mr. Olin

St. Louis

• • • **More than two billion rifle and machine gun cartridges, enough to girdle the globe "nine times at the equator, with side trips to Tokyo and Berlin," have been produced by the St. Louis Ordnance Plant, according to an announcement issued by John M. Olin, vice-president of Western Cartridge Co., which operates the plant.**

Placed end-to-end in a single line, he said, the 0.30 and 0.50 cal. cartridges would stretch to the moon. In other words, production has exceeded a total greater than the population of the earth.

Nickerson Heads New Consultant Division

Washington

• • • **Establishment** of a Management Consultant Division with John W. Nickerson, Manchester, Conn., as director, has been announced by Charles E. Wilson, executive vice-chairman of WPB. Mr. Nickerson will advise on broad management practices to promote effectiveness in war production, Mr. Wilson said.

Special emphasis will be given to studies and recommendations regarding incentive plans, production standards and other matters. The division has been authorized, upon request, to advise WLB as to the probable effect on costs, wages and production of proposed incentive plans submitted by labor and management. Such engineering investigations are to be made in conjunction with the Labor Production Office. The division will also assist in the establishment of joint labor-management committees in essential industries in accordance with policies of the War Production Drive Division from which the present Management Consultant Branch has been transferred to the new division.

U. S. Steel Exporters Advance Post-War Ambitions

New York

• • • **The United States Steel Corp.** appears to be among the first to push post-war planning through the training of 15 export sales representatives of the corporation from many parts of the world. Mill visitations and study conferences are being afforded the men in a 22-week course taking them to every important corporation plant in the nation.

Theory behind the training course is aimed at developing the highest possible type of export sales representative to intelligently accommodate anticipated post-war markets.

Starting June 1 these men visited and studied steelmaking methods at the corporation's T.C.&I. installations in Birmingham and have since visited Carnegie-Illinois plants in Pittsburgh, American Bridge Co. at Ambridge, Pa., National Tube at Elwood City, Pa., and Lorain, Ohio and are now viewing American Steel & Wire plants from Cuyahoga, Ohio, to Gary, Mill visitation will cease Aug. 28 to be immediately followed by conferences in New York which will continue into November.

PERFORATED METALS

★

Any Metal

Any Perforation

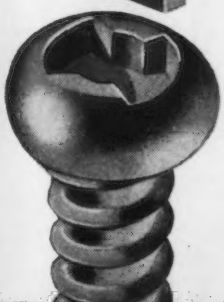
For **INDUSTRIAL** purposes a great variety of sizes and shapes of perforations are required, ranging from very fine to as large as 6" or more in diameter. We are equipped to supply all standard perforations in all kinds and thicknesses of metals.

ORNAMENTAL patterns are covered by our grille catalog. If interested, we hope you will send for it. There are attractive patterns for different uses.

The Harrington & King Perforating Co.

5657 FILLMORE ST., CHICAGO 44 • 114 LIBERTY ST., NEW YORK 6

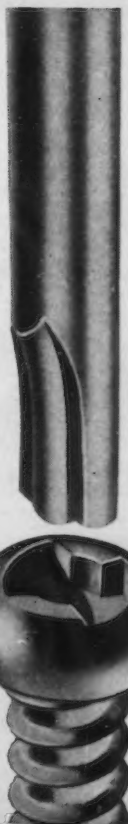
We Engineers realize that *performance in the field* must rank in equal importance with quantity and quality in production schedules. The fact that CLUTCH HEAD SCREWS may be removed and replaced with a standard type screwdriver is accepted by us as the first definite answer to a hitherto serious handicap in field work. While thus simplifying and quickening field service, CLUTCH HEAD SCREWS have everything that makes for safe, speedy, and economical production. The deep clutch provides an easy-to-hit bull's-eye on the assembly line... into which the Center Pivot bit self-centers for elimination of "slippage"... conserving operator energy for the drive home with less effort... all for a smoother, faster tempo of factory production that is vitally important to both efficiency and lowered costs. So, we Engineers who plan and produce can join issue with you men in the field who "keep 'em rolling."



CLUTCH HEADS, the *only* modern screws that may be operated with a standard type screwdriver or an Assembly Bit, are performing today an important wartime service. They are available in Standard and Thread-forming types for every purpose.

CLUTCH HEAD · SCREWS ·

ECONOMY is an important feature of this Center Pivot Assembly Bit. No "back-to-the-factory" shipment is necessary for reconditioning. A brief application of the end surface to a grinding wheel fully restores original maximum efficiency.

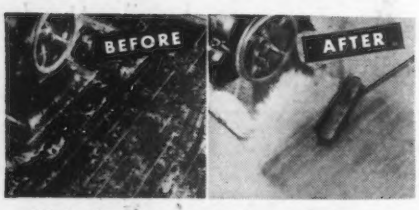


UNITED SCREW AND BOLT CORPORATION

CHICAGO CLEVELAND NEW YORK

Ever check up on your porters an hour or two after they've scrubbed and scoured the oily, greasy floors in your plant? Ever notice how, in hot weather, oil and grease "bleed" out of the old deposits, just as though the floors hadn't been cleaned at all? That's not the porter's fault. It's *your* fault. If your floors are cleaned with SPEEDI-DRI they won't bleed, because SPEEDI-DRI draws old oil stains out of wood, concrete, or metal.

SPEEDI-DRI does even more than that. It sets up an immediate non-skid surface. It acts as a fire retardant. It brightens and lightens the whole room. It saves workmen's shoes from oil-rot and helps to prevent skin diseases of the feet. It conserves vital manpower because it is easily spread by hand and as easily cleaned up. It saves time because it can be applied and removed without interrupting production. It improves employee-morale because it makes the plant a cleaner, safer place in which to work. For all-around effectiveness in oil-absorption and floor-area-covered there is no other product that can compare with SPEEDI-DRI.



Write for a generous, free sample and test it in your own plant. (If you use water soluble oils or if water is also on your floors, ask for SOL-SPEEDI-DRI.) End the menace of bleeding floors in your plant quickly, effectively, and economically with SPEEDI-DRI.

SPEEDI-DRI
OIL AND GREASE ABSORBENT

SUPPLIERS

East — **REFINERS LUBRICATING CO.**
New York 1, N. Y.

Midwest and South
WAVERLY PETROLEUM PRODUCTS CO.
Philadelphia 6, Pa.

West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Menlo Park, Calif.

Need AA-5 Rating for Heating Equipment

• • • **Revision** of the extended surface heating equipment order, L-107, was announced by WPB on July 28.

The revised order restricts distribution of extended surface heating equipment to "Approved Orders"—those which specify a delivery date, are rated AA-5 or better or which are for repair parts.

Schedule I to L-107 provides an extensive simplification program for the industry.

WPB Limits Graphite Crucible Production

Washington

• • • **To conserve** the available supply of graphite, WPB has limited the manufacture of both standard size and special size graphite crucibles. A large proportion of the special crucibles are being used by the aluminum industry to replace iron melting pots. With the issuance of Supplementary Conservation Order M-61-a certain sizes of standard crucibles may no longer be made and no manufacturer may make any size of special crucible he had not made before July 27.

New Version of WPB-2945 (PD-600) Is Issued by WPB

Washington

• • • **The** WPB Chemicals Division has issued a revised version of Form PD-600, now designated as WPB-2945. Considerably smaller than the old one, but not differing in any important respect, the new form was issued to permit greater ease in typing to permit its return to applicants in window envelopes, thereby conserving many hours of manpower, WPB said. The Chemicals Division has urged all applicants to obtain the new copy from WPB field offices and discontinue using the old form as soon as possible.

WPB Forms Committees For Aluminum and Platinum

• • • **Among** WPB advisory committees announced this week were:

Aluminum Foundry Industry Advisory Committee

Government Presiding Officer: Frederick Ayer II. Committee members: C. J. Amick, vice president, Century Metalcraft Corp., Los Angeles; C. A. Brantingham, president, Ebaloy Foundries, Inc., Rockford, Ill.; Bruce W. Burroughs, executive vice president, National Bronze & Aluminum Foundry Co., Cleveland; E. G. Fahlman, president, Permold Co., Medina, Ohio; Grant Fink, Servel, Inc., Evansville, Ind.; Frank Gaines, vice president, So. Cal. Foundry, Los Angeles; H. G. Lamker, superintendent of foundries, Wright Aeronautical Corp., Paterson, N. J.; A. J. Langhammer, president, Amplex Division, Chrysler Corp., Detroit; B. H. Newell, assistant manufacturing manager, Buick Motor Division, General Motors Corp., Detroit; Randolph J. Roshirt, general manager, Bohn Aluminum & Brass Corp., Detroit; A. Rossett, sales manager, Chicago Aluminum Castings Co., Chicago; Harry L. Smith, Jr., product manager, Aluminum Co. of America, Cleveland; Karl A. Stein, president, Acme Pattern & Tool Co., Inc., Dayton.

Platinum Group Metals Producers and Distributors Industry Advisory Committee

Government Presiding Officer: R. J. Lund. Committee members are: Sydney Cohn, president, Sigmund Cohn & Co., New York; H. Whitehead, Baker & Co., Inc., Newark, N. J.; R. Bayes, American Platinum Works, Inc., Newark, N. J.; Marc S. Goldsmith, vice president, Goldsmith Bros. Smelting & Refining Co., Chicago; S. H. Headland, secretary, Wildberg Bros. Smelting & Refining Co., San Francisco; C. J. Johnson, treasurer, Goodnews Bay Mining Co., Seattle; W. C. Kerrigan, assistant sales manager, International Nickel Co., New York; Hugh Lehrfeld, owner, Kastenhuber & Lehrfeld, New York; J. A. Samuel, president, J. A. Samuel & Co., New York; C. W. Stones, president, Johnson, Matthey & Co., Inc., New York.

•

Twenty-four executives of firms manufacturing farm equipment, rep-

Additional CMP Developments

• Direction 10 to Reg. 5 assigns a preference rating of AA-2 to repair shops for the acquisition of welding rod regardless of whether or not the shop carries welding rod as an operating supply. (Release No. TCS-671)

•

• Int. 9 of Reg. 5 provides that in cases where specific WPB authorization is not required under order L-41 to begin construction, CMP Regulation 5 procedures may be used to obtain required materials and products up to $500 in cost. (Release No. TCS-719)

•

• Bulletin 41 has been issued stating the conditions under which purchasers may obtain authorization to purchase steel through the Steel Recovery Corp. without deduction from their allotment.

•

• Production directives on steel will, mainly, cover both prime as well as other qualities with the exception being in the case of tin mill products.

•

• When notifying all aluminum fabricators and distributors of the new reporting forms applicable to the last quarter, WPB declared that the Class B product symbols to be used in fourth quarter are now frozen for the future. (Release No. CMPL-368)

•

• The CMP Division has instructed that if a mill cannot accept an order for brass mill products, the customer must be advised that delivery cannot be filled within the time limit required, that the order should be placed with another mill, or possibly the order be reallotted for delivery in a later month. (Release No. CMPL-380)

•

• WPB has ruled that copper wire mill products when withdrawn from warehouses may be replaced with orders filed on the mills or with other warehouses. (Release No. CMPL-375)

It's a cinch, our adman said, to write this is a "pipe,"
I needn't make a layout or set a lot of type.

The only thing I have to do is build a factual rhyme,
That tells how hard we're working to get you steel on time!

When you need an angle quick, or a beam or bar,
We can get it to you, no matter where you are.

At any time of day . . . or even if it's night,
You can rely on Levinson to do the job just right.

LEVINSON STEEL SALES CO.
33 PRIDE STREET · PITTSBURGH, PENNA.
Warehouse and Specialty Steels

4

DOES *One Part* GIVE YOUR WHOLE PLANT "INSPECTION JITTERS"?

DO inspection rejections of difficult precision parts put jitters of confusion into your production schedules? Do delays in producing such parts in your own plant, or troubles in having them made elsewhere, handicap the free flow of your assembly lines?

Contact KAYDON

CAPACITY Immediately AVAILABLE for ball and roller BEARINGS Size 6" to 60"

For precision in metal-working, Kaydon is organized to produce peculiarly difficult parts efficiently. By reason of long experience in extreme accuracy, plus advanced methods and equipment for production and inspection, the Kaydon organization is qualified to assure you of "delivery when needed" of parts made exactly as specified.

For excellence in production of extremely precise, unusually large ball and roller bearings.

THE KAYDON ENGINEERING CORP.

McCRACKEN STREET • MUSKEGON 81, MICH.

Specialists in Difficult Manufacturing

"HOW IS POR-OS-WAY DOING ON HIGH-SPEED STEEL CUTTERS?"

Dear Charlie:
You wanted to know how Por-os-way's doing on high-speed steel cutters. So here goes from the [redacted] plant. These cutters are for finning airplane cylinder barrels. Production is up 66 2/3%. no more burning and no rejects. The boys are sure fussy about their work and sold on Por-os-way. Can you blame 'em?
Your roving reporter,
"Vic"

READ THIS, WRITES
POR-OS-WAY'S
WAR PLANT REPORTER

THE RECORD	POR-OS-WAY WHEEL	FORMER WHEEL
Production per man per hour	5 sets (20 pcs.)	3 sets (12 pcs.)
Pieces per dressing	8 to 12	3
Wheel life	8 hours	6 hours
Stock to be removed	.010"—.018"	Same
Depth of cut per pass	.003"	.001"
Rejects	None	0.5 to 1%
Operations eliminated	Cutting shoulder	
Production Increase	66⅔%	
Remarks: Former wheel burned work. Por-os-way grinds cool, holds corner.		

THE JOB:
Grinding sets of Huther high-speed steel cutters for finning airplane cylinder barrels on a universal tool and cutter grinder.

THE WHEEL: Por-os-way 7" x ½" x 1¼" 9A60HV2.

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent.

SOTH-O-TEAR

Write for complete booklet "Facts About Por-os-way". The address is 434 Wheatland Street, Phoenixville, Pennsylvania.

2 TO 5 TIMES MORE WAR PRODUCTION PER MAN PER MACHINE

POR-OS-WAY*
a new RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.
COPYRIGHT, 1943, A. P. de Sanno & Son, Inc.

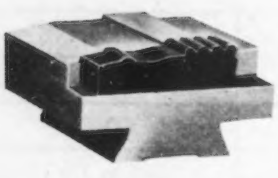
Grinds ANY DESIRED PROFILE

IN TUNGSTEN CARBIDE OR OTHER HARD METALS

DIRECTLY from the drawing

Looking down on the Wickman Profile Grinder showing layout, pantograph, microscope and work table assembly.

TYPICAL EXAMPLES OF WORK GROUND AND INSPECTED ON THIS MACHINE WITHOUT USE OF RADIUS DRESSER OR FORMED WHEEL



Tungsten Carbide Tipped Form Tool
Width of Carbide tip . . . . 1¾"
Depth of Cut . . . . . .150"
Stock removed . . . approx. .040"
*Grinding time . . . . . 3½ hrs.

Tungsten Carbide Tipped Form Tool
Width of carbide tip . . . . . ½"
Depth of cut . . . . . .240"
Stock removed . . . approx. .040"
*Grinding time . . . . . 1 hr.

*Includes setup and complete inspection of contour before removal from machine.

The Wickman Profile Grinder has demonstrated its precision and efficiency in the plants of a number of the country's most important manufacturers. In 1941 it introduced a new method of profile grinding to American industry—a process in which a 50 times size layout, a pantograph system, microscopic inspection, and a universal grinder are coordinated to produce profile grinding to an accuracy within ± .0005". It is now being used to grind flat and circular form tools, punches and die segments, profile gages, special cams, templates and many other irregular parts from a wide variety of materials including tungsten carbide.

The first of these Wickman Profile Grinders were designed and built to conform to basically sound and thoroughly tested engineering principles. With the improvements which have since been made, the present machines offer the utmost in efficient, trouble-free performance.

A completely descriptive folder covering today's Wickman Profile Grinder is yours for the asking.

WICKMAN PROFILE GRINDER

THE Wickman CORPORATION
15537 WOODROW WILSON
DETROIT, MICHIGAN

resenting all parts of the country, have been appointed to serve on a Farm Machinery and Equipment Industry Advisory Commiteee, the OPA announced recently. Personnel includes:

O. F. Becker, general manager, R. Herschel Mfg. Co., Inc., Peoria; L. J. Brower, secretary, Brower Mfg. Co., Quincy, Ill.; Colin Brown, president, E. C. Brown Co., Rochester, N. Y.; Z. W. Craine, president, Craine, Inc., Norwich, N. Y.; H. L. Dempster, Dempster Mill Mfg. Co., Beatrice, Neb.; William J. Fisher, A. B. Farquhar Co., Ltd., York, Pa.; D. Ray Hall, president, Gravely Motor Plow and Cultivator Co., Dunbar, W. Va.; C. A. Mines, president, Farm Tools, Inc., Manfield, Ohio; I. H. Hull, president, National Farm Machinery Cooperative, Inc., Indianapolis, Ind.; W. K. Hyslop, vice president and general manager, Massey-Harris Co., Inc., Racine, Wis.; Stephen Mahon, vice president, James Mfg. Co., Fort Atkinson, Wis.; Theodore Johnson, secretary, J. I. Case Co., Racine, Wis.; George A. Kelly, vice president, G. A. Kelly Plow Co., Longview, Texas; Roger M. Keyes, executive vice-president, Harry Ferguson, Inc., Dearborn, Mich.; W. C. MacFarlane, president and general manager, Minneapolis-Moline Power Implement Co., Minneapolis; J. L. McCaffrey, vice-president, International Harvester Co., Chicago (or H. A. Homan, alternate); A. King McCord, executive vice-president, Oliver Farm Equipment Co., Chicago (or N. Guy Snyder, alternate); Carl Peterson, comptroller, David Bradley Mfg. Works, Bradley, Ill.; John C. Myers, F. E. Myers & Bro. Co., Ashland, Ohio; Wade Newbegin, president, R. M. Wade & Co., Portland, Ore.; W. A. Roberts, manager of Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee; W. H. Roberts, Jr., sales manager, S. L. Allen & Co., Inc., Philadelphia; Frank Silloway, vice-president, Deere & Co., Moline, Ill.; George G. Stoddard, vice president, De Laval Separator Co., New York.

Improperly filled Forms Returned to Applicants

Washington

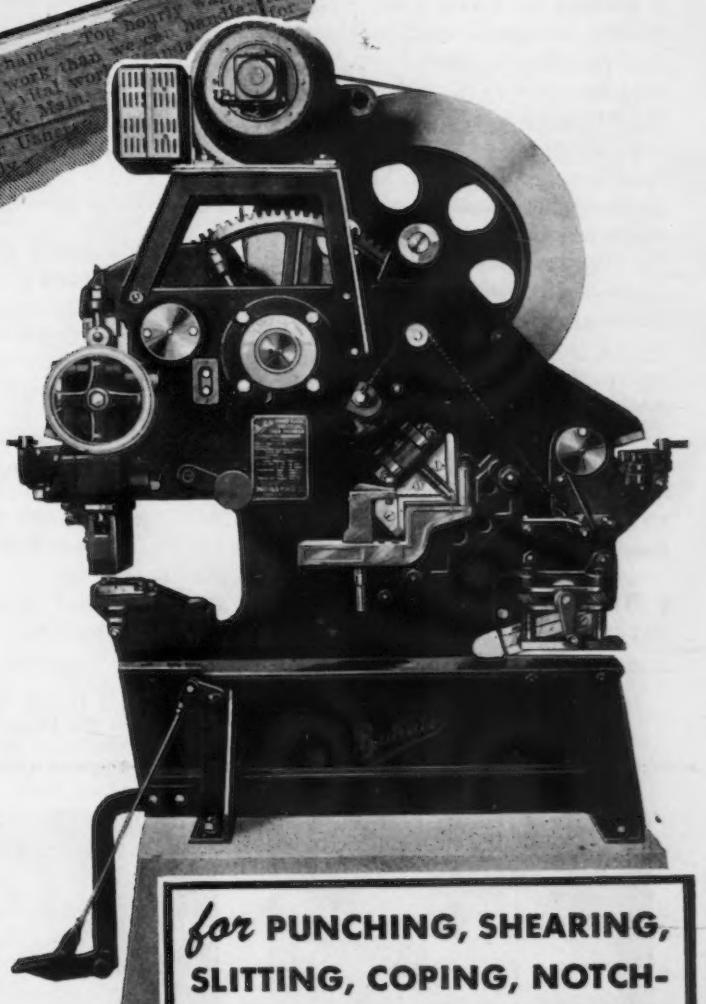
• • • **Because of** failure to fill them out properly several hundred WPB-547 (formerly PD-1X) forms are being returned to applicants each week, the WPB Wholesale and Retail Trade Division reported last week. The blanks are used by distributors in obtaining priority assistance for replenishments of inventories. It was pointed out that unless the blanks are filled out carefully and completely the applications will be returned.

The previous PD-1X became obsolete on Aug. 1. Any requests for priority assistance received on this form postmarked after that date will be rejected and returned.

COMING EVENTS

Sept. 28 to 30—Iron and Steel Engineers convention, Pittsburgh.
Oct. 13 to 16—The Electrochemical Society, Inc., New York.
Oct. 18 to 22—National Metal Congress and Exposition, Chicago.
Oct. 28, 29—American Institute of mining Engineers and American Society of Mechanical Engineers, Pittsburgh.

There's never a lag in the built-in capacity of Buffalo Universal Iron Workers to handle the toughest fabrication jobs on a 24-hour-a-day schedule. The efficiency of these versatile tools makes every man hour "pay off" in terms of maximum production. Designed for ease of control and unfailing accuracy plus speed of output, Buffalo Universal Iron Workers are meeting urgent war needs *on time*.



★

BUFFALO FORGE COMPANY

492 Broadway Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

for **PUNCHING, SHEARING, SLITTING, COPING, NOTCHING of ANGLES, TEES, CHANNELS, I-BEAMS, ROUNDS, SQUARES, FLAT STEEL . . . .**

"Buffalo" UNIVERSAL IRON WORKER

PERSONALS

• **William James Russell,** former manager of engineering at Westinghouse, has been appointed vice-president in charge of engineering for Landers, Frary & Clark Co., New Britain, Conn. Mr. Russell came to the United States from Scotland in 1920. In 1924 he joined Westinghouse Electric & Mfg. Co. at its Springfield, Mass. Works, as a tool and die maker. In 1934 he was appointed manager of engineering at the Appliance Division of Westinghouse at Mansfield, Ohio.

• **Howard L. Dawson** has been appointed assistant chief engineer of Carnegie-Illinois Steel Corp. to succeed the late L. C. Edgar. **Charles H. Williams,** assistant to vice-president in charge of engineering, U. S. Steel Corp. of Delaware, has been appointed chief engineer of the Pittsburgh district to succeed Mr. Dawson. Mr. Dawson has been employed by Carnegie-Illinois since 1910, being transferred from the Edgar Thomson Works to the Pittsburgh general offices in 1939. Mr. Williams was formerly assistant chief engineer of the Youngstown district of the company, was transferred to Pittsburgh as power and fuel engineer, and in June 1942 was appointed to his position in the Delaware Corp.

• **William B. Griese,** formerly plant manager of the liquid cooled engine division, Aviation Corp., Toledo, has been appointed as plant manager of the Spencer Heater Division, Williamsport. For 17 years before joining the Aviation Corp. Mr. Griese was with the Crosley Corp., Cincinnati.

WILLIAM JAMES RUSSELL, vice-president in charge of engineering, Landers, Frary & Clark Co., New Britain, Conn.

• **Matthew R. Rosse** has been appointed sales manager, export division, Wickwire Spencer Steel Co., N. Y. He succeeds W. H. Lyon.

Prior to joining Wickwire Spencer, Mr. Rosse was for the past eight years assistant export manager of the American Chain & Cable Co.

• **F. W. Waterman, Jr.,** has been appointed forecast engineer, Carnegie-Illinois Steel Corp., Pittsburgh. He has been in the forecast bureau since 1940.

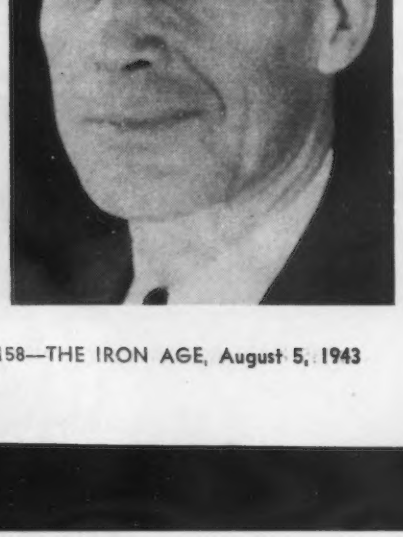
• **G. W. Thomson** has been appointed abrasive engineer for Norton Co., Worcester, Mass. His territory will include the states of Oklahoma, Arkansas, western Tennessee and the northern parts of Texas, Louisiana and Mississippi. **Henry L. LeMay** of the sales engineering department at Worcester will take over Mr. Thomson's former territory in northern Illinois. **J. P. Landers,** who has been located in the research laboratories and sales engineering department at Worcester, will do field engineering work in New York and New Jersey.

• **M. C. Horine,** sales promotion manager of Mack Trucks, Inc., Long Island City, N. Y., has been appointed special consultant to the director, Automotive Division, WPB. Mr. Horine has been granted leave of absence from Mack and will make his headquarters in Washington.

• **Elmer Gammeter,** who resigned as manager of the stainless steel bureau, Chicago district division, Carnegie-Illinois Steel Corp., has been appointed chief metallurgist of the Globe Steel Tubes Co., Milwaukee.

• **Frank Cordes** has resigned as board chairman of the Blaw-Knox Co., Pittsburgh, and has been elected president and general manager of Pittsburgh Steel Foundry Co., Glassport, Pa. He will succeed **Parker Wilson,** who has resigned.

HOWARD L. DAWSON, assistant chief engineer, Carnegie-Illinois Corp., Pittsburgh.



WILLIAM B. GRIESE, plant manager of the Spencer Heater Division, Aviation Corp., Williamsport, Pa.

MATTHEW R. ROSSE, sales manager, export division, Wickwire Spencer Steel Co., N. Y.

Bachrach photograph

• **Harvey McKenney** has been made manager of the new alloy steel sales department of Follansbee Steel Corp., Pittsburgh. Mr. McKenney was formerly associated with Carnegie-Illinois Steel Corp. and Crucible Steel Co. He was also a former member of the WPB.

• **L. W. Slack** has been made sales manager of the car and service divisions, Packard Motor Car Co., Detroit. Mr. Slack has been acting general sales manager since last August. He joined the Packard organization in 1934 as assistant sales promotion manager, and in 1936 was transferred to the sales department and made an assistant sales manager.

• **William D. Stansil,** secretary of the LaFayette, Ind., Chamber of Commerce has been appointed executive manager of the Manufacturers' Association of Racine, Wis.

• **J. M. Tucker,** former vice-president and general sales manager of the Oliver Farm Equipment Co., has been appointed assistant to W. K. Hyslop, vice-president and general manager of the Massey-Harris Co., Racine, Wis.

• **William P. Witherow** and **William C. Frye,** were elected to the board of trustees of the Northwestern Mutual Life Insurance Co. at the annual election. They succeed the late Max W. Babb, former chairman of the board of Allis-Chalmers Mfg. Co., and the late Albert C. Elser. Mr. Witherow is president and a director of Blaw-Knox Co., Pittsburgh, and Steel Products Co., McKees Rocks, Pa. Mr. Frye, is a director of the Chain Belt Co., Interstate Drop Forge Co., and Sivyer Steel Casting Co., Milwaukee.

• **Norman G. Keeling,** manager of the B. F. Goodrich Silvertown Stores in the Akron area since 1939, has been appointed manager of the Washington office of the International Sales Division of the company. Mr. Keeling succeeds **Paul Dietz,** who has resigned to become general export manager of the Allis-Chalmers Mfg. Co.

• **Dr. Eugene M. Baroody,** physicist, has been named to the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he will conduct special research investigations in applying high frequency vibrations in the field of industrial physics.

• **Milo McCammon** has been named assistant general production manager of the Bendix Products Division of Bendix Aviation Corp. He was formerly supervisor of production planning at Hudson Motor Car Co. He joined the Bendix company as supervisor of job assignment and later production manager in 1941.

HARVEY McKENNEY, manager of alloy steel sales, Follansbee Steel Corp., Pittsburgh.

• **H. A. Weissbrodt,** deputy director in charge of the production service division of WPB's Detroit office resigned recently to return to his duties at the Chicago plant of International Harvester Co.

• **Harry B. Gilmore,** secretary of the Western Electric Co., will retire September 1st after 41 years of service. **Norman R. Frame,** assistant secretary was elected secretary by the directors to succeed him. Mr. Gilmore joined the Western Electric Co. in 1901, and for the next quarter century worked with the merchandising side of the business. Mr. Gilmore was elected secretary in 1925.

Mr. Frame has been with the company 20 years. He was elected assistant secretary a few months ago.

• **W. F. Dashiell** has been appointed southern district sales manager for the Boston Woven Hose & Rubber Co., Boston. Mr. Dashiell has been with the company for fifteen years. His headquarters will be at Richmond, Va.

• **W. F. Sewart** has been appointed assistant sales manager of the hardware products division, Wickwire Spencer Steel Co., New York. Mr. Sewart has been with the company since 1923 as a sales correspondent in its export department.

• **William B. Corbett** has been appointed plant engineer of Willys-Overland Motors, Inc., Toledo. Mr. Corbett was formerly associated with the Chrysler Corp. in an engineering capacity. **George Bluth** has been made general chief inspector of the company. Mr. Bluth was formerly with General Motors Co., and a member of the inspection staff of the U. S. Army in Detroit.

• **Philip Schane, Jr.,** has been made chief process metallurgist of the Pittsburgh district of the Carnegie-Illinois Corp. Mr. Schane was formerly chief metallurgist at the Duquesne Works of the company.

• **T. M. Bohen,** Whitehead Metal Products Co., New York, has been elected president of the newly formed Brass Mill Products Distributors Association. **L. B. McGraw,** Williams & Co., Inc., Pittsburgh, was chosen vice-president, while **E. F. McCarthy,** Beals-McCarthy & Rogers Co., Buffalo, was elected secretary-treasurer.

OBITUARY...

• **Otto C. Kusterman,** owner and founder of the Hercules Cutting Die Co., Milwaukee, died July 20. He established the Hercules firm 16 years ago.

• **Frederic H. Dorsch,** temperature control engineer with the Johnson Service Co., Milwaukee, died July 18. He had been with the firm 38 years and retired several years ago. He was 72 years of age.

• **Otto F. Ladtkow,** superintendent of the Oxweld Railroad Service Co., Milwaukee, died at his home July 19. He had retired last January after 28 years with the company, He was 65 years of age.

• **Frank M. Young,** sales engineer for many years in the Milwaukee district for the Dodge Mfg. Co., died recently.

• **John R. Montgomery,** president of the former Reliance Silver Co., Milwaukee, died recently. He was 76 years of age.

• **George H. Selke, Sr.,** chemist and executive of the Milwaukee Coke & Gas Co., Milwaukee, died July 8. He was a member of the American Chemical society. He was 58 years of age.

• **J. G. August Winner,** for 21 years president of the Hilgren Mfg. Co., Cedarburg, Wis., before its liquidation two years ago, died July 9 at his home in Milwaukee.

MACHINE TOOLS

. . . News and Market Activities

Another Machinery Price Order Changed

• • • **Amendment No. 96** to Price Regulation 136, effective July 29 sets as the "new base price" for machines sold on a delivered basis, the maximum price of a new equivalent delivered to the point where the second-hand machine is located at the time of its purchase by the seller. The point where the seller purchases the second-hand machine, rather than the point where he sells it, is used as the base point.

The amendment also makes a change with respect to the payment of broker's fees. An inadvertent omission which occurred in Amendment No. 62 is corrected in the latest revision. That amendment added gears, pinions, sprockets and speed reducers to Appendix A with the exception of: (1) automotive or tractor transmissions, transfer cases, power take-offs, differentials or axle assemblies and (2) any items designed for use in private or commercial motor vehicles, and (3) any items specially designed for use in vehicles, aircraft or equipment used primarily for military purposes. The same amendment added the items mentioned in (3) to Appendix B. This left the implication that Appendix B covered the items mentioned in (1) where they were designed for equipment used for military purposes. This amendment clarifies the original intent by excluding from the gears listed in Appendix B, the transmissions and other items named in (1). Such items when designed for military vehicles, are excluded from the regulation. Such items not designed for military vehicles, along with items mentioned in (2), are covered by Appendix B under the category of "automotive parts, subassemblies and accessories."

Another article dealing with Price Regulation No. 1 appears in this issue on page 105. See also last week's issue, page 94.

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Production Well Maintained

Cincinnati

• • • **Despite pessimistic reports** on the general machine tool situation in other areas, the Cincinnati manufacturers indicate that while the picture lacks the boom proportions of a year ago, the slack in business in this area has not yet reached the pessimistic levels elsewhere indicated. Heavy machine tool manufacturers are still in a reasonably firm position so far as backlogs are concerned, which is the normal trend, these types of machine tools being the last to get under way on an up trend and by the same token the last to feel a sharp down trend. Manufacturers of lighter tools indicate there has been a marked let-up in new business and that order piles are rapidly diminishing. In some types of tools, these manufacturers indicate that almost current shipment rates can be promised. Production, however, in local machine tool plants is being maintained at the same high level as heretofore, which, of course, means a more rapid reduction of backlogs. Policies of retrenchment are being followed with most plants not replacing all of the men who leave their employ so that the downward curve of production will be in about the same proportion as the downward curve in employment. Management, however, is accelerating plans for conversion to other types of war production as well as putting pressure on research departments to line up post war production of other articles as well as machine tools.

•

Two Old N. Y. Machine Tool Companies United

• • • **Purchase of** all the outstanding capital stock of the Edlund Machinery Co., Inc., of Cortland, N. Y., by C. C. Bradley & Son, Inc., of Syracuse from Lawrence Harrison of New York City has united two of the oldest machine tool manufacturing concerns in New York state.

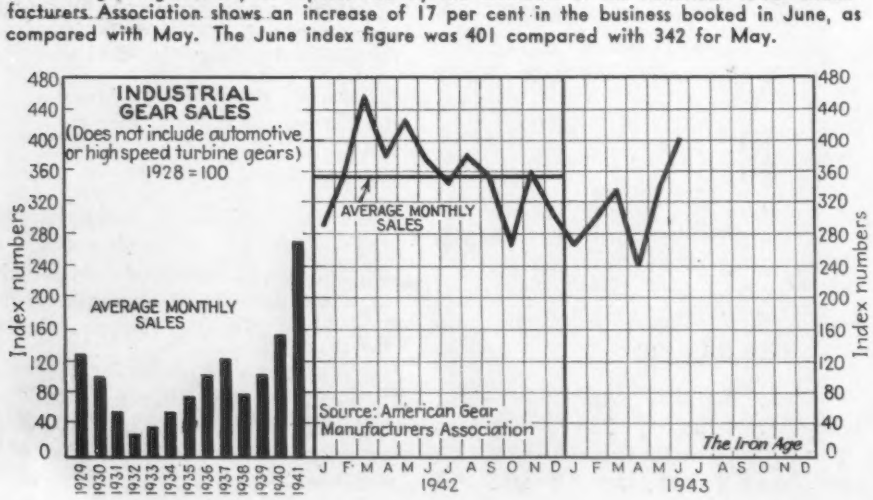
The Edlund Co. was founded in 1918 by the late John Edlund. Main product of the company is the Edlund sensitive drilling machine. The Bradley Co. was founded in Syracuse about 1910, and is one of the oldest manufacturing concerns in central New York state. New officers of the company are: D. W. Norris, president, W. J. During, executive vice-president, and C. Goodwin Bradley, secretary. Emory Dunning retains his position as vice-president and general manager, and Miss Genevieve O. Edlund, daughter of the founder, has been re-elected to her position of vice-president and office manager. Ray D. Bradley is vice-president and chief engineer.

Abrasive Deliveries Checked

• • • **Dates on which a producer** or importer who desires to use, or any person who desires to accept, delivery of manufactured crude abrasive or abrasive grain during September and October must apply for authorization were advanced last week by the War Production Board through an amendment to Conservation Order M-319.

Gear Sales Increased 17 Per Cent in June

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows an increase of 17 per cent in the business booked in June, as compared with May. The June index figure was 401 compared with 342 for May.



Giddings & Lewis Horizontal with Continuous Feed Facing and Boring Head Cuts 300-Hour Job to 100 Hours . . .

This Forging Die was formerly machined by boring one-half at a time. With the G & L Continuous Feed Facing and Boring Head both parts are machined simultaneously with greater speed, accuracy and economy of cutting tools. Tool settings have been reduced to a minimum. Jump cutting with the old method placed a burden upon the tools. Proper mating diameters and finish are obtained because both parts are machined simultaneously in one setting.

On this and similar dies in this plant the machining time has been cut one-third with the G & L Horizontal equipped with the continuous feed facing and boring head.

Additional flexibility and capacity for handling unusual jobs can be added to your G & L Horizontal through the application of a G & L rotary table together with G & L Continuous Feed Facing and Boring Head. Boring, facing and back-facing can be performed on several surfaces by merely indexing the table and engaging the cross-slide of the head. Investigate the complete features and advantages on this equipment today. Write for the descriptive folder offered at the right.

Complete Die Bored In Only One Setting . . .

Prior to machining on the G & L Horizontal, both parts are opened up straight through on a planer to enable a boring bar to be inserted. The operations on the largest bore are performed as follows. The other two bores are machined in a similar manner.

Operations

1. Bore 5¼" Dia. for a Distance of 4¾" with Conventional Boring Bar.
2. Bore from front 7¾" Dia. Using Conventional Boring Bar.
3. Bore 12" Dia., 13¼" Deep Using Conventional Boring Bar.
4. Recess 13¼" Dia. Using the Continuous Feed Facing Head, Set Off Center.
5. Finish Bore 13¼" Dia. Using the Continuous Feed Facing Head.
6. Form Radius in Corner with Tool Ground to Proper Radius Using Continuous Feed Facing Head.

NOTE: Built in scales and verniers easily permit working to .001" on center distances between holes and the location of the bores accurately on the split of the die.

Additional Data

Additional data is contained in this folder. When making inquiry please indicate your business connection and type and size of machine used. Ask for Bulletin No. 83.

GIDDINGS & LEWIS MACHINE TOOL CO.

136 DOTY ST., FOND DU LAC, WISCONSIN

NON-FERROUS METALS

. . . News and Market Activities

Aluminum Ingot Orders Unbalanced

• • • **WPB, seeking to correct** the trend by which primary aluminum producers are overburdened by orders while secondary ingots are backing up at the smelters, has notified foundries and die casting plants to challenge any orders they receive specifying the use of primary metal. The claimant agencies, WPB said, rarely specify use of primary metal when issuing contracts. Instead a performance standard for the ultimate end product is usually specified, and in most instances this could be attained with metal produced by secondary smelters.

The responsibility for the situation rests, according to WPB, either with the foundries, which may be ordering a higher grade of metal than is necessary because of easier handling, or with unnecessarily stringent standards being set by consumers. The situation has developed since the change in operational procedure under CMP, whereby foundries are licensed to purchase ingots without submitting their individual orders to WPB for analysis. The situation, WPB says, is daily becoming more aggravated.

Besides asking foundries to scrutinize orders for primary metal specification, and to report data on such orders to the castings section of the Aluminum and Magnesium Division, WPB has invited foundries already using a large proportion of secondary alloys to build up their inventories of this material to a 60-day supply, instead of the normal 30-day inventory.

•

Aluminum Castings Output

• • • **Production of high** strength heat treated aluminum castings has doubled during the past 18 months, WPB announced July 29, pointing out that at the same time, non-heat-treated sandcastings, the principal peace time type, have remained at the same production level. Since the start of the war, the use of dense castings made on high pressure cold chamber machines for aircraft and ordnance uses has grown to the point where these constitute over 80 per cent of total shipments.

Total shipments of castings during 1942 were 324,075,000 lb., according to the WPB report. Permanent mold castings shipped in 1942 amounted to 60,663,000 lb. and die castings 55,924,000 lb.

Shipments of all types of castings in May aggregated 37,815,000 lb.; sand castings amounted to 25,104,000 lb. Of the latter figure 10,548,000 lb. were cylinder heads. Shipments of permanent mold castings in May totaled 7,667,000 lb. and this included 6,988,000 lb. of heat-treated and 679,000 lb. of non-heat-treated.

•

Magnesium Off Critical List

• • • **Magnesium has for** the first time been removed from Group I of WPB's Materials Substitutions and Supply List, and placed in Group II, thereby changing its status from a material the supply of which is insufficient for war and essential industrial demands, to a material sufficiently plentiful for essential needs. Still remaining in Group I are copper, tin, zinc, bismuth and cadmium.

Meantime OPA has relaxed its rules in the case of certain special magnesium alloy shapes which cannot be produced at the regular premium of 1c. a lb. permitted for non-standard shapes. Producers have been authorized to submit proposed prices for such shapes to OPA for approval.

•

Brief Notes:

• • • **The British countries,** which before the war did more than 50 per cent of the world's tin smelting, are now exceeded in output by the combined smelter production of the United States, Belgian Congo and China. . . . Some Arizona marginal mines are getting as high as 27c. a lb. for copper. . . . A civil suit charging Bohn Aluminum & Brass Corp. with production of defective parts for aircraft motors, has been filed by the government in Federal court at Detoit. . . . The Tin Producers' Association, pointing out that the long term trend of tin consumption is steadily upward, forecasts a resulting upward trend in price. This conclusion is disputed by the London *Metal Bulletin*, which says increased output should mean lower prices.

NEW HEROES' MEDAL: Steps in the production of the new Navy and Marine medal, being made at the U. S. Mint, are shown here. Bronze is poured into molds to form ingots which will be pressed, and then passed through the stamping machine. The other photo shows a mint engraver at work on the electric plate from which the die is cast for the new medal.

Wide World Photos

Refiner, Smelter Quotations

(Cents per lb.)

Copper, electrolytic, Conn. Valley	12.00
Copper, electrolytic, New York	11.75
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67
Lead, St. Louis	6.35
Lead, New York	6.50
Aluminum, virgin 99+%, delivered	15.00
Nickel, electrolytic, base refinery	35.00
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Cadmium, delivered	90.00

ALUMINUM, No. 12 foundry grade (No. 2), 13.50c. per lb.; steel deoxidizing grades, 12.50c. to 13.75c. per lb. ANTIMONY, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. Laredo, Tex., smelter. MERCURY, $191 to $193 per 76-lb. flask, f.o.b. shipping point or port of entry. BRASS INGOTS, commercial 85-5-5-5 (No. 115), 12.25c. a lb. COBALT, 97 to 99 per cent, $2.11 per lb. BERYLLIUM COPPER, 3.75 to 4.25 per cent Be., $15 per lb. contained Be. GOLD, U. S. Treasury, $35 an oz. INDIUM, 99.5 per cent, $10 per troy oz. IRIDIUM, $165 per troy oz. PALLADIUM, $24 per troy oz. PLATINUM, $35 per oz. SILVER, open market, New York, 44.75c. per oz. ARSENIC, prime, white, 99 per cent, 4c. per lb.

Copper, Copper Base Alloys

(Mill base prices)

Sheet: Copper, 20.87c.; high brass, 19.48c.; low brass, 80 per cent, 20.15c.; red brass, 85 per cent, 20.36c.; commercial bronze, 90 per cent, 21.07c., 95 per cent, 21.28c.; manganese bronze, 28.00c.; muntz metal, 22.75c.; naval brass, 24.50c.; phosphor bronze, grades A, B, 5 per cent, 36.25c.; Everdur, Herculoy, Olympic or equivalent, 26.00c.; nickel silver, 5 per cent, 26.50c.

Rods: Copper, hot rolled, 17.37c.; drawn, 18.37c.; free cutting brass, 15.01c.; low brass, 80 per cent, 20.40c.; red brass, 85 per cent, 20.61c.; commercial bronze, 90 per cent, 21.32c., 95 per cent, 21.53c.; Muntz metal, 18.87c.; naval brass, 19.12c.; phosphor bronze, grades A, B, 5 per cent, 36.50c.; Everdur, Herculoy, Olympic or equivalent, 25.50c.; nickel silver, 5 per cent, 28.75c.

Extruded Shapes: Copper, 20.87c.; architectural bronze, 19.12c.; manganese bronze, 24.00c.; Muntz metal, 20.12c.; naval brass, 20.37c.

ALUMINUM

Tubing: 2 in. O.D. x 0.065 in. wall: 2S, 40c. per lb. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c. per lb.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base price for tubing; 30,000-lb. base price for plate, flat stock. Variations from the above gage, size, temper, finish and quantity require extras.

Extruded Shapes: "As extruded" temper; 2000-lb. base price. 2S and 3S, factor No. 1 to 4, 25.5c. per lb.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by the weight per lineal foot. All prices above are subject to factor number range, temper, length, dimensional tolerances and quantity extras.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Variation from the above size, temper, finish and quantity require extras.

MAGNESIUM

Sheet, rod, tubes, bars and extruded shapes are subject to individual quotation. Magnesium Metal Turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c. a lb.

NON-FERROUS SCRAP METAL QUOTATIONS

Copper, Copper Base Alloy

(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1] 6.25[2]
Manganese bronze borings	6.50[1] 5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

(Current OPA maximum prices, cents per lb., for less than 1000 lb. lots, f.o.b. point of shipment, plus premiums for quantities and special preparation.)

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
Wrought alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For lots of 1000 to 19,999 lb., add 1c. to above prices except for old castings and forgings, pistons free of struts, pistons with struts and old alloy sheet for which there is a premium of ½c. a lb. For lots over 19,999 lb. add 1½c. a lb. to prices listed.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

(Current OPA maximum prices, cents per lb., f.o.b., shipping point.)

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Soft and hard lead, including cable lead, f.o.b. point of shipment, deduct 0.55c. per lb. from basing point prices for refined metal.

Nickel

Nickel content 98 + per cent, copper under ½ per cent, 26c. per lb.; 90 to 98 per cent nickel, 23c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞c.
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Battle Scrap Termed Aid to Dealers

New York

• • • **Biggest news** in an otherwise static market last week concerned the arrival at an undisclosed Atlantic port of 10 Liberty ships each bearing about 550 tons of mixed Allied and Nazi battlefield scrap from North Africa. This appears to be the first large scale movement of battlefield scrap in this war and according to the Army Service Command here is only the beginning of "a steady flow" to be expected from every battlefield on the Allied fronts. This initial 55,000 ton shipment also well confirms the recent statement of Edwin C. Barringer, Scrap Institute president, that about 550,000 tons of such material could be expected in this country during the balance of the year. (IRON AGE, July 29, page 120.)

Most recent information on the fate of such scrap after entering the country indicates that the Army first will sort the material for reusable parts and repairable units and also remove any live ammunition or enemy equipment required for study and offer the material unprepared beyond this point for bids by dealers. Thus, inflow of such scrap is seen as an aid to dealers.

Early predictions have stated that battlefield scrap entering on the East Coast would be entirely absorbed by Eastern mills as is highly possible since much of the material is expected to be heavy quality scrap. However, if the tonnage becomes as large as the Army indicates it may become by its phrase "a steady flow" some tonnages may be diverted further inland. West Coast shipments may also be expected.

Barringer Sees Situation Comfortable

• • • **Reviewing** the impressive war job which the industry has turned in, the new yearbook issued by Edwin C. Barringer, president of the Institute of Scrap Iron and Steel Inc., states that as of midyear 1943, the most comfortable supply situation of the entire war now exists.

"There is reasonable assurance that the production of steel can be expanded to the desired 2,000,000 tons in the last half of this year without excessive strain upon the supply of scrap," Barringer says. "Yet a prudent regard for the national safety demands that the situation be re-canvassed periodically; that moderate stimulation of collections be continued, and that the industry be in position to tap additional resources."

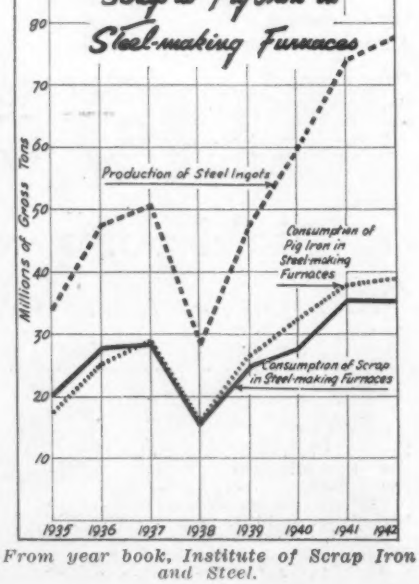
"Looking backward, the consumption of scrap during the defense and war period 1940-42 inconclusive appears most impressive. The melt in these three years has totaled 147,000,000 gross tons."

Pointing out that the scrap dealer is really a manufacturer, the Institute's annual review touches upon the subject of costs as follows:

"A scrap yard in the East, which is regarded as a model of efficiency and is noted for its humanitarian treatment of labor, distributes a cost of $4.32 per gross ton for bundling as follows: Wages, $2.08; electric power, 34c.; repairs and supplies, 57c.; depreciation, 50c.; insurance, 24c.; office salaries, 25c.; taxes, 12c.; office expenses, including travel and advertising, 22c.

"For preparing heavy iron this yard analyzes its cost at an average of $4.10 per gross ton, distributed as follows: Wages, $2.23; electric power, 8c.; repairs and supplies, 20c.; depreciation, 34c.; insurance, 33c.; office salaries, 12c.; taxes, 10c.; oxygen and acetylene, 10c.; truck expenses, 37c., and office expenses, including travel and advertising, 23c.

"None of these costs include officers salaries, return on capital, or contributions."



From year book, Institute of Scrap Iron and Steel.

Coal Strikes Deplete Inventories of Scrap

New York

• • • Irving S. Olds, chairman of U. S. Steel Corp., at his press conference last week, asserted the coal strikes had depleted scrap inventories at subsidiary plants of the corporation. About 90,000 tons was used during the mine shutdowns. The scrap outlook is "favorable at the moment," he said, "but scrap is still something to think about."

Michaels and Keywell Get New Posts in Institute

• • • **Directors** of the Institute of Scrap Iron & Steel, Inc., last week elected Everett B. Michaels of Hyman-Michaels Co., Chicago, vice-president to fill the vacancy caused by the resignation of Lieut. Col. Philip W. Frieder last May to accept a commission in the Army. Samuel G. Keywell, of Samuel G. Keywell Co., Detroit, was elected treasurer, to succeed Mr. Michaels.

The directors also extended the term of Edwin C. Barringer to January, 1945. Mr. Barringer's term as Institute president expires in January, 1944.

•

PITTSBURGH — Scrap demand continues brisk, with the leading interest still in the market.

•

PHILADELPHIA—A good amount of industrial and dealer scrap is available, although shipments of cast and gray foundry scrap are a bit slower.

•

CINCINNATI — While no immediate pinch is indicated in this area, dealers continue to warn consumers of possible shortages in the fall. Their predictions are based on the fact they do not have reserve stocks at present.

•

BIRMINGHAM—Few orders are being placed for material of any grade and the orders being placed are on a 30-day shipment basis only.

•

BOSTON — Interest centers in the quotas set by the WLB for last half New England scrap salvage. Total for New England is set at 947,500 tons, 114,500 more than was collected the first half of this year.

•

ST. LOUIS—Receipts of scrap iron continue light and dealers say labor shortage hampers gathering and fabricating scrap.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

	BASE PRICE SEGREGATED Solids, Lb. Cont. W	Turnings, Lb. Cont. W	BASE PRICE UNSEGREGATED SOLIDS	BASE PRICE UNSEGREGATED TURNINGS
Type 1	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2	1.60	1.40	$1.15 per lb. contained W if over 1% and less than 5%.	$1.00 per lb. contained W if 1% and less than 5%.
Type 3	1.25	1.25		
Type 4*	0.125	0.105	$0.80 per lb. contained Mo if 1½% or more.	$0.70 per lb. contained Mo if 1½% or more.
Type 5*	0.135	0.115		

*Per lb. of scrap material.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Aug. 3, 1943	July 27, 1943	July 6, 1943	Aug. 4, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Aug. 3, 1943	July 27, 1943	July 6, 1943	Aug. 1942
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.8
No. 2, Valley furnace	24.00	24.00	24.00	24.0
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.6
No. 2, Birmingham	20.38	20.38	20.38	20.3
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.0
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.3
Basic, Valley furnace	23.50	23.50	23.50	23.5
Malleable, Chicago†	24.00	24.00	24.00	24.0
Malleable, Valley	24.00	24.00	24.00	24.0
L. S. charcoal, Chicago	31.34	31.34	31.34	31.3
Ferromanganese	135.00	135.00	135.00	135.0

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.0
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.7
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.7
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.8
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.5
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.0
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.0
No. 1 cast, Ch'go	20.00	20.00	20.00	20.0
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.0
Foundry coke, prompt	7.50	7.375	6.875	6.8
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.0
Copper, Lake, New York	12.00	12.00	12.00	12.0
Tin (Straits), New York	52.00	52.00	52.00	52.0
Zinc, East St. Louis	8.25	8.25	8.25	8.2
Lead, St. Louis	6.35	6.35	6.35	6.3
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.0
Nickel, electrolytic	35.00	35.00	35.00	35.0
Magnesium, ingot	20.50	20.50	20.50	22.5
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.5

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 163 to 175.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
August 3, 1943	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 1
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr.
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 1
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 2
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 2
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan.
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 2
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec.
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec.

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 } Electro tin plate, box	$4.50	$4.50	$4.50												
.75 } Electro tin plate, box	$4.65		$4.65												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢[13]	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES							(Coatesville and Claymont = 2.10¢)								
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.31¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

[1] Mill run sheets are 10c, per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 29,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	†† Hot Rolled, 2300	‡ Hot Rolled, 3100	†† Cold Drawn, 2300	‡ Cold Drawn, 3100
*Philadelphia	$3.518	$4.872[5]	$5.018	$3.922	$4.772	$3.605	$3.666	$3.822	$4.072		$7.116		
*New York	3.590	4.613[2]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	6.008	7.158	7.303	8.453
*Boston	3.774	4.744	5.224	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
*Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
*Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
*Washington	3.596	4.841	5.196	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
*Chicago	3.25	4.20	5.23[4]	3.60	4.65[8]	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
*Milwaukee	3.387	4.337[2]	5.272[4]	3.737	4.787[8]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
*Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
*Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
*Detroit	3.45	4.50	5.00[4]	3.70	5.909[8]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
*Cincinnati	3.425	4.475[2]	4.825[1]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
*St. Louis	3.397	4.247[2]	5.172[4]	3.747	4.931[8]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
*Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
*Omaha	3.865	5.443	5.608[4]	4.215		4.165	4.165	4.115	4.443	....	....	....	....
*Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45[3]		4.75[1]	3.70[3]	....	3.55[3]	3.55[3]	3.50[3]	4.43	....	....	....	....
Memphis	3.85	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.75	5.43	5.25	4.30	....	5.25	5.25	3.75	4.50	....	....	....	....
†Los Angeles	4.95	7.15	5.95	4.90	....	4.90	4.60	4.35	5.70	9.55	8.55	10.55	9.55
†San Francisco	4.55	7.55	6.60	4.50	....	4.65	4.35	3.95	5.55	9.80	8.80	10.80	9.80
†Seattle	4.65[7]	6.63	5.70[7]	4.25	....	4.75	4.45	4.20	5.75	....	8.00	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT							Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8020	.18/ .23	1.00/1.30	.040	.040	.20/ .35			.10/ .20	.45	9.00	.95c	$19.00
NE 8442*	.40/ .45	1.30/1.60	.040	.040	.20/ .35			.30/ .40	.90	18.00	1.40	28.00
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/ .65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.20/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30c	$26.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9630	.28/ .33	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9635	.33/ .38	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9637	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9640	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9642	.40/ .45	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9645	.43/ .48	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9650	.48/ .53	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over: Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. [8] 2000 to 39,999 lb. At Philadelphia galvanized sheets, 2500 more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb.; galvanized and cold rolled sheets, 750 to 4999 lb.; cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.: Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lbs.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

†† For zoned cities these grades have been revised to NE 8617-20.

‡ For zoned cities these grades have been revised to NE 9442-45 Ann'ld.

* Base delivered prices according to price zones established by Amendments to RPS 49 including the 3% transportation tax—not including the 6% freight increase of March 18, 1942, rescinded May 15, 1943.

***Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; f.o.b. Duluth, billets only, $2 higher. Delivered prices do not reflect new per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	$54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 202
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

To Hold Gears with precision
FOR BORING OR GRINDING
HAVE TEETH GRIPPED THIS WAY
ON THE LINE OF ACTION
ON THE LINE OF ACTION

Method eliminates distortion. Gripping action distributed around circumference rather than through diameter. Principle used only in

MATCH-IT GEAR CHUCKS

For grinding the hole, the hub face, or for boring even the most delicately constructed gears within your tolerances in relation to pitch diameter. Distance from root diameter to the hole or counterbore of any gear never presents a problem, as pressure is always against the sides of teeth, never toward the center along diameter to cause distortion.

MATCH-IT GEAR CHUCKS are made for internal and external gears, spur and helical gears, and countershaft type gears.

***All* your gears of the above mentioned types can have perfect, round holes. If your production gives you too many scrapped gears, perhaps your chucking can be improved. Our engineers can help you deliver a higher percentage of perfect gears.**

BUY WAR BONDS

LeMaire TOOL AND MFG. CO.

2661 TELEGRAPH ROAD DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

Tough as a Commando

-and like commandos, given those jobs that require "the best!"--

For those assignments where service conditions are known to be unusually severe, or where they carry the unknown "X-value" of stress that cannot be exactly figured, British Commandos and American Rangers are chosen in warfare. For those same assignments in war equipment, Ampco Metal is the usual choice of design or operating engineers.

This special bronze alloy, like those special shock troops, has established a splendid reputation for delivering more than is expected of it. For a combination of high strength, exceptional life through resistance to wear, high fatigue strength, and general all-around versatile performance, Ampco Metal is without equal in the bronze alloy field. It plays a part in the construction of most aircraft, heavy ordnance, heavy machinery and machine tools. . . . Put Ampco Metal to service in your equipment where parts are failing, and gain the satisfaction of solving a difficult metal problem.

Ask for "File 41" — Engineering Data Sheets that give case histories and technical data. . . . It's free.

AMPCO METAL, INC., Milwaukee 4, Wis.

DEPARTMENT IA-8

AMPCO METAL

THE METAL WITHOUT AN EQUAL

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe) Base Price—$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

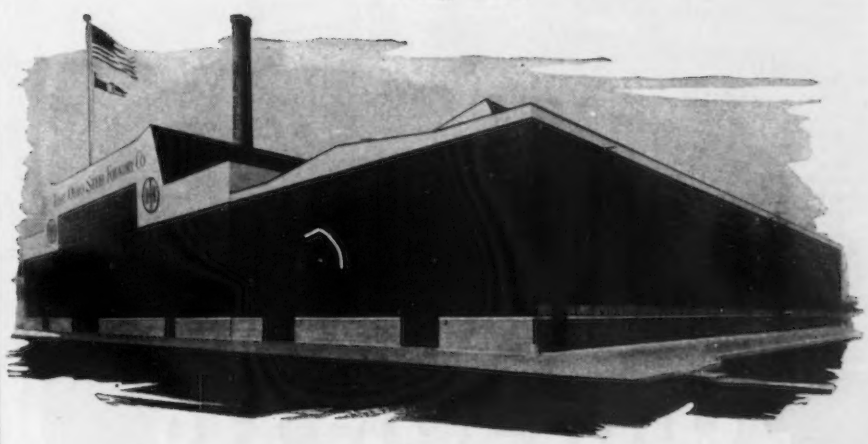
F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

THE OHIO STEEL FOUNDRY CO. *Selects another* Carey BUILT-UP ROOF

▲ *Designed by Albert Kahn, Inc.*

Bonded Built-Up Roof Applied by the Asbestos Roofing & Sheet Metal Co., Lima, Ohio.

General Contractor, Darin & Armstrong, Detroit.



INDUSTRIES whose parent structures have been protected by CAREY Built-Up Roofs *consistently specify* this same dependable Roof when erecting additions and new buildings.

Take the Ohio Steel Foundry Company, for example. A CAREY Built-Up Roof was specified for its modern roll and machine shop. And when an addition was recently erected to meet war production requirements, a CAREY Built-Up Roof — bonded to give 20 years of repair-free, trouble-free service — was again the choice.

CAREY Built-Up Roofs, protecting plants and equipment the nation over, are performing a vital wartime service. Profit from the experience of other industries. Make sure *your* next roof is a CAREY Roof! Write for book, "Master Specifications for Built-Up Roofs"—address Dept. 26.

●

THE PHILIP CAREY MFG. COMPANY

Dependable Products Since 1873

LOCKLAND, CINCINNATI, OHIO

In Canada: The Philip Carey Company, Ltd. Office and Factory: Lennoxville, P.Q.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	*$25.00*	*$24.50*	*$26.00*	*$26.50*	.....	.....
Brooklyn	*27.50*			*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$31.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*22.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	*22.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$28.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $23.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

JOHNSON XLO Music Wire

High grade steel spring wire in constant demand by makers of experimental parts, tool and die workers, many others. XLO Music Wire comes to you in familiar red and silver packages in units of ¼ lb., ½ lb., and 1 lb., as well as 5 lb. packages and catch weight coils. Wire sizes from .005" to .200" dia.

JOHNSON STEEL & WIRE CO., INC.
WORCESTER ★ MASSACHUSETTS
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES

Metal Powders

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25⅛c.
Iron, commercial, 100 and 200 mesh	13½ to 15c.
Iron, crushed, 200 mesh and finer	4c.
Iron, hydrogen reduced, 300 mesh and finer	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh	42c.
Iron, carbonyl, 300 mesh and finer	90c.
Aluminum, 100 and 200 mesh.	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh,	8½c. plus metal
Tin, 100 mesh	58¾c.

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorous, 51.50	4.35

*Adjustments are made to indicated prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$6.50*

Foundry

†Connellsville, prompt	$7.50
Fayette County, W. Va. (Beehive)	$8.10
By-product, Chicago	$12.25
By-product, New England	$13.75
By-product, Newark	$12.40 to $12.95
By-product, Philadelphia	$12.38
By-product, Cleveland	$12.30
By-product, Cincinnati	$11.75
By-product, Birmingham	$8.50†
By-product, St. Louis	$12.02
By-product, Buffalo	$12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge $7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

	Per Net Ton
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$33.00
Domestic, f.o.b. Ohio River landing barges	33.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	33.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick	
Pennsylvania & Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

LEE

Quality Springs

ALL SHAPES · ALL SIZES · ALL MATERIALS

LEE SPRING COMPANY, Inc.

30 MAIN STREET BROOKLYN, N.Y.

LEE-BUILT TRADE MARK SPRINGS

Safe Welding

AT LOWER PRODUCTION COSTS

The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs

WELDIT
MODEL "CW"
BLOW
TORCH

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

WELDIT ACETYLENE CO.

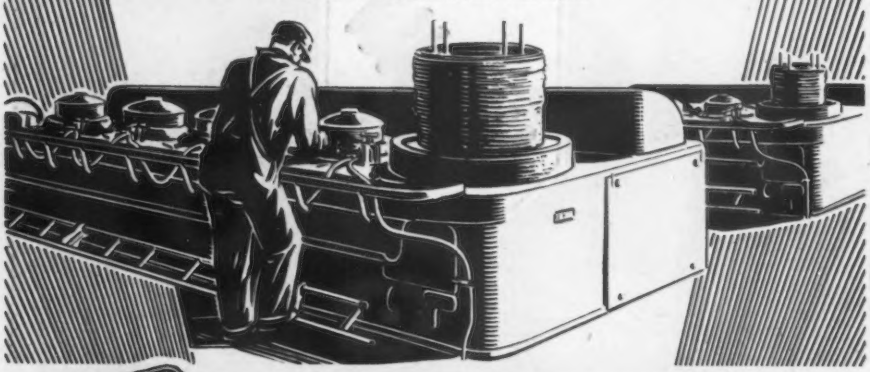
641 BAGLEY AVENUE · DETROIT 26, MICH.

WIRE
FOR A THOUSAND USES

From rods to be forged into airplane parts to fine gauge wire for paper matches, Continental manufacturer's wire is made to meet exacting product requirements. When war needs can be satisfied, Continental will be better equipped than ever to serve your needs.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA

Plants at Canton, Kokomo, and Indianapolis

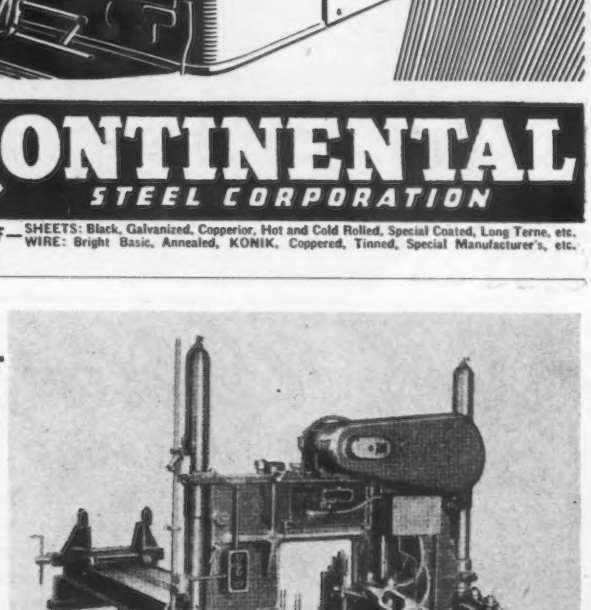


CONTINENTAL SUPERIOR STEEL

CONTINENTAL
STEEL CORPORATION

PRODUCERS OF— SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc.
WIRE: Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc.

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18".
Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	143.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size, 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots...	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$41.00	$42.00	$55.50
Less ton	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above Silvery Iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car Lots ...	3.35c	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(Per gross ton, delivered, carloads, bulk)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb...	5.80c.†
Packed	6.05c.†
Less-ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon ..	25.00c.	25.40c.	26.00c.
0.06% carbon ..	23.00c.	23.40c.	24.00c.
0.10% carbon ..	22.50c.	22.90c.	23.50c.
1.00% carbon ..	20.50c.	20.90c.	21.50c.
2.00% carbon ..	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

Other Ferroalloys

Ferrotungsten, delivered, carlots, per lb. contained tungsten ...	$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium	$2.70
Special grade	$2.80
Very special grade	$2.90
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50 % boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per pound contained boron....	$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium ..	$2.25
Less-ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less-ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less-ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore & St. Louis, per gross ton.	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala. carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo.....	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less-ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton.	$102.50
Packed	$107.50
Less-ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. ...	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots, f.o.b. Phila., Ohio, per lb. ton lots	9.50c.
Less-1 ton lots	10.50c.

11 in. bore x 6 ft. Hannifin hydraulic cylinder designed for use in a steel mill. Maximum working pressure 2000 lbs. sq. in.

BIG

PRECISION CYLINDERS

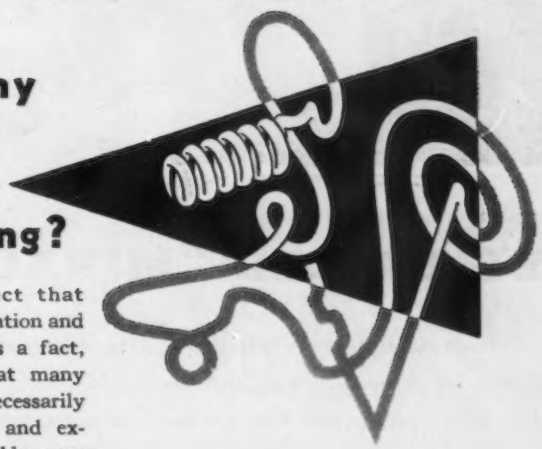
Big or little, Hannifin cylinders all present the same advantages of no-tie-rod design and precision construction with mirror-finish honed cylinder bores. Honing produces a straight, round, perfectly finished cylinder interior, for high efficiency piston seal with minimum fluid slip and maximum power.

Whether you need unusually large cylinders or small sizes, Hannifin precision construction can help you make the most of hydraulic power advantages. Hannifin cylinders are built in seven standard mounting types, with or without cushion. All sizes, any length of stroke, for working pressures up to 1000 and 1500 psi. Special cylinders built to order. Write for Bulletin 35-A giving complete specifications.

HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue • Chicago 24, Illinois

How many BENDS in a Spring?



Here's a subject that deserves close attention and investigation. It's a fact, sad but true, that many springs are unnecessarily intricate, difficult and expensive to make, all because of lack of understanding of the ultimate purpose. Ofttimes, a simplified design — or a different type of material can do wonders in the way of reducing costs and "upping" performance. Here's where experience in spring design pays off. Let the springmaker in on your requirements — in the early stages if possible.

A good spring in time saves nine!

DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.

Division of Associated Spring Corporation

HE'S CALLED "MIRACLE MAN"

SMOKE from stacks in a score of great plants etch his name against the industrial sky. He's a production wizard who refuses to tolerate the word "impossible." But he'll admit proudly that his achievements are the result of organizing and coordinating the talents of others.

In one of his plants, for instance, the chances are you would find parts, assemblies and machines of precision workmanship by Joyce, writing new records in speed and precision. For another plant, Joyce may be producing and assembling vital and integral parts of these weapons of war—parts where hairline precision can mean the difference between success or failure.

Joyce designing and engineering skill is helping to achieve production miracles in many great industrial plants from coast to coast. And Joyce's own large-scale production facilities are maintaining a steady stream of war material for our fighting forces—covering a wide and constantly varying range of machined and fabricated parts and products.

If you face production problems in your business—either for war work or post-war production—the Joyce "know how" is at your service. A Joyce representative will be glad to call and explain in detail the unique advantages we offer.

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BEHIND THE MAN ▸ BEHIND THE MAN ▸ BEHIND THE GUN